THE IRON TRADE REVIEW

VOLUME XXV. CLEVELAND, O. OCTOBER 20, 1892. CHICAGO, ILL. NUMBER 42.

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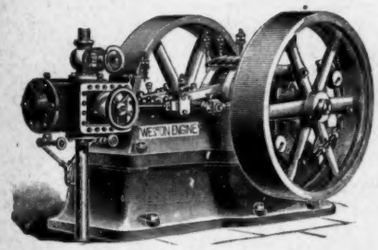

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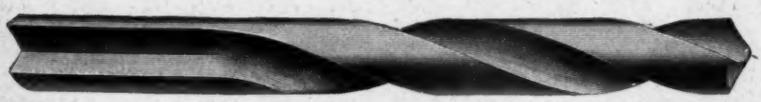

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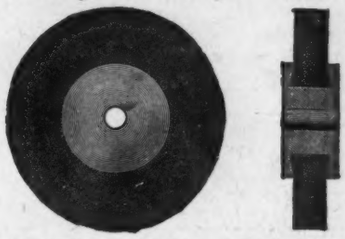

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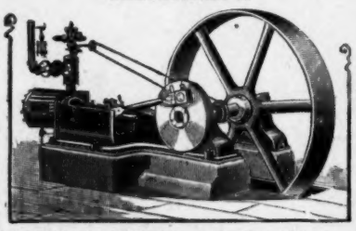

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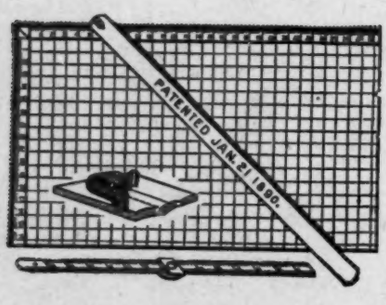

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THE IRON TRADE REVIEW

VOLUME XXV. CLEVELAND, O. OCTOBER 20, 1892. CHICAGO, ILL. NUMBER 42.

THE WEEK IN IRON CIRCLES.

GENERAL FEATURES.

The quarterly report of the American Iron and Steel Association as to the stocks of unsold pig iron on hand confirm what the monthly reports from other sources have been telling as to the excess of consumption over production. Between June 30 and Sept. 30, unsold pig iron on hand dropped from 826,500 net tons to 691,468 net tons, a decrease of 135,032, making the stocks at the beginning of this month the smallest reported in the year, and only 13,575 tons more than at the close of '91. The further fact that 16 more furnaces blew out in the quarter, than were blown in, gives additional ground for the hopeful tone of the market. The recent statement of Mr. H. F. DeBardeleben that the Tennessee Coal, Iron & Railroad Co. had 110,000 tons of iron on hand and orders for 190,000 tons on its books, explains the basis on which the recent advances in Southern quotations were made. These are not sufficient, yet, to bring back into activity furnaces that blew out because they could not make iron at any profit at going prices. The report that furnace firms South are proceeding conservatively in the effort for better prices indicates a thorough appreciation of existing conditions. The situation warrants no other policy. There has not yet been a transaction of any size at the advanced figures, and while Western buyers have furnished a fair demand at current quotations, Virginia furnaces are still on the old basis in the Eastern market. Pittsburgh reports a fair activity, but prices remain the same as quoted a week ago, with Bessemer rather weaker. There is no promise, moreover, that the status of Bessemer pig will be bettered at any early date; yet there are those who believe that it will not only catch up but in time will relatively distance the other grades of pig metal. This view certainly does not contemplate that the Carnegie Co. is to be a seller of raw Bessemer, as it has been in the week past. Billets recovered somewhat, early in the week, from the low prices touched a week or ten days ago, and $22.50 was the going figure for deliveries running to the end of the year, with one or two transactions on a higher basis. Mills are running everywhere to their full capacity and the demand for finished material is constant, with prices fairly remunerative. The structural mills report that there is no slacking of demand and are holding prices firmly. From a few foundries and mills there is a report of disappointing business but they are a small minority. The coke trade is hampered by drouth and scarcity of cars. Production fell off 8,000 tons in the Connellsville region last week. The *Courier* predicts 6,000,000 tons production this year, as against 4,929,960 in 1891, and 6,221,518, the highest, in 1890. General conditions all continue favorable. Rates are hardening at money centers. Railroad earnings show gratifying increase over last year.

THE LOCAL OUTLOOK.

Whether it be in ore charters, in iron ore or in pig iron, the local market has shown nothing noteworthy within the week. The vessel men are beginning to feel that their inning has come at last and the four cent wheat rate from Duluth that has ruled strong in the past few days, has brought Ashland ore tonnage up to $1.30, with talk of $1.35, but nothing done at that figure. The Marquette rate is $1.10, with little business closed, and Escanaba tonnage has not been brought above 75 cents, to Ohio ports. Mines on the Marquette range that have access to Escanaba are able to save about 10 cents a ton by sending their ore to docks there, under existing rates. Wheat transport has engaged the attention of the fleet in the week, and the amount of ore put on docks is the smallest for any week since May. Mining companies think twice before adding to the stock of unsold ore on dock, at present freights.

Iron Ore. While there is some inquiry for ore, nothing above 10,000 or 15,000 ton purchases are in contemplation, and transactions of the week have been of the 1,000 and 2,000 ton order. The hopeful reports from certain pig iron selling points have made no impression as yet on the ore market, unless the firmness of standard Bessemer hematite be an effect. Skeptical as the average furnacemen may be as to any report of better prices for iron ore, it is yet a fact that certain Bessemer hematites are now held at 15c to 25c above the $4.25 at which most of the season's sales have been made. Non-Bessemer ores lowest in phosphorus are bringing from $3.25 to $3.50. Negotiations pending for the sale of New England and Lone Jack ores, Mesaba range, by a local firm, are practically concluded.

Pig Iron. It may safely be predicted that the number of active furnaces in the two valleys, now 13, will not be increased to any extent until the talk of an advance materializes into an actual dollar more per ton for the furnacemen. No encouragement to such a step is to be found in the course of the market in the week just ending. The advent of the Carnegie Co. as a seller in the Bessemer pig iron market was marked by transactions as low as $13.50 Pittsburgh, or $12.90 at Valley furnace, the lowest yet recorded. Whether this is merely a temporary condition remains to be seen. On Scotch foundry irons there is a firmer holding of prices, but recent transactions have been small.

Finished Iron, etc. The mills maintain the recent advance to 1.70c for bar iron and there is no diminution of demand. Light sheets are still hard to get on prompt orders and higher prices are asked. Galvanized sheets are a trifle higher, 70 and 5 being present discounts. Structural material, under continuing demand, shows more strength, and on smaller beams and channels 2.15c @ 2.20c are quotations. Angles are firm at 1.90c. Fall building requirements are still a large factor.

GENERAL MARKET RESUME.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Chicago. A good business is reported for nearly all kinds of pig metal, with prices holding firmly to quotations. Several rather large deals that have been pending for some time were closed last week, and a number of sales of 1,000 and 500 ton lots are reported. The published reports showing a heavy reduction of stocks have had their effect upon the local market, and a stronger feeling is apparent. Lake Superior charcoal is showing this feeling in that the furnaces are unwilling to sell under $17.

BAR IRON.—A large demand is reported, but the mills are still unable to book orders for immediate delivery. Quotations are unchanged. Common bar, 1.65c; refined new muck bar, 1.72c, f. o. b. Chicago.

BILLETS AND RODS.—The mills are still refusing orders for immediate delivery, and the demand continues fair. Prices are unchanged. Billets, $24.50; rods, $34.50.

RAILS AND TRACK SUPPLIES.—Business continues to be fair, sales being made mostly in small lots. Rails, $31.00 to $32.50; track bolts, hexagon nuts, 2.65c; square nuts, 2.55c; spikes, 2.05c to 2.10c.

STRUCTURAL IRON.—The mills are refusing orders except for late delivery, and the demand continues to be larger. Beams and channels, 2.25c to 2 50c; angle bars, 2c to 2.15c; sheared plates, 2.10c to 2.25c; tees, 2.35c to 2.50c.

PLATES, TUBES, ETC.—Conditions remain about the same as last week, the business in boiler plates being exceptionally good. Tank plates are quoted at 2.30c at the mills; flange steel, 2.30c to 2.35c; tubes are selling at discounts of 55 and 57½, and 62½ and 65 per cent.

MERCHANT STEEL.—A little firmer feeling is noted, though quotations are unchanged. An excellent demand is reported. Open-hearth spring, 2.35c to 2 40; tire, 2c to 2.15c; machinery, 2.20c to 2.25c; crucible spring, 3.60c; machinery, 4.75c; tool steel, 6½c and upwards; Bessemer bars, 1.90c to 2c.

SHEETS.—Business is in about the same conditions as at last reported—the demand being large, and the mills unwilling to sell except for future delivery. Galvanized sheets are being quoted at 70 and 7½ per cent., and 70 and 5 per cent. at the mills, and 65 and 10 per cent. and 70 per cent. from store. Black sheets are selling for 3c f. o. b. Chicago.

OLD RAILS, SCRAP, ETC.—Business continues to be very slow, and prices are as last quoted. Old rails, $17.50 to $18; old wheels, $14; old steel rails, $12 to $13; No. 1 forge, $14; No. 1 mill, $11; turnings, $8; mixed steel, $9; coil steel, $13.50; leaf steel, $14.50; low tires, $14.50.

Wheeling. There is the same pressure upon iron and steel mills that has been noted for several weeks, yet the urgency of buyers brings no better prices to the manufacturer. In pig iron, there is a moderate demand. Southern forge irons come into close competition with iron from the Valley, pushing the latter down to $12 at mill. Bessemer iron remains weak, $13.75 @ $14 being the range of quotation. Billets are weaker and deliveries running into February are contracted for at prices ranging from $22.25 to $22.75. Quick shipment orders are at $23 to $23.25.

Pittsburgh. While the raw iron market shows well maintained activity, there is no noteworthy change in prices. Sales of from 15,000 to 20,000 tons of Bessemer iron are reported at prices ranging from $13.70 to $14, the latter figure still being the top of the market. Foundry irons are in light demand, and forge irons are not so largely sold as in the past month. Some Valley furnaces refuse to make any contracts on mill irons at less than $12.75 Pittsburgh, but transactions are still reported at $12 50. Billets and slabs have recovered in some measure from the weakness of last week, and sales of 10,000 tons at $22.75, deliveries running into February, indicate that the desire of a few mills to get orders requiring all their output through the Winter, that appeared in last week's buying, was not shared by other billet-makers. On deliveries running through November $23 is an average of the market. Muck bar is in moderate demand at about $24.75 for October and November deliveries.

Cincinnati. The market has been quiet the past week, with no change whatever as regards the position of the furnaces relative to the late advance. Inquiries have been more numerous this week than usual, which is strong evidence that buyers are becoming quite anxious. The general reports from the furnaces show a still further decrease in the output, and consumption remains steady. While there may be several furnaces now out of blast that could, in all probability, resume on 10 days' notice, it would take more than $1 per ton advance above present prices to induce them to blow in, for they readily understand that at present figures there is no profit in the business. Therefore a very active demand at from 50 cents to 75 cents per ton above present market would not increase the output, although such a move would bring many buyers in the market. The week has seen some small advances, but mostly of a nature to even up grades that had not previously been advanced. No. 2 foundry stands firm at $9.75 cash, and grey forge at $8 75, and other grades in proportion. These figures are f. o. b. cars Birmingham. Tennessee furnaces, which are nearer market, get the benefit of the difference in freight.

Detroit. Business for the past week has been more active, and some transactions of considerable magnitude have been made. Southern iron is most called for. Prices on some special brands have been advanced, and on others deliveries are not accepted beyond the first of January except at higher figures. In several instances, buyers who declined to purchase two weeks ago are now anxious to take the iron at prices previously quoted. The large falling off in stocks has helped make buyers realize that bottom has been reached, and higher prices are reasonably certain to rule before the first of the year. The close of navigation being so near at hand, the buyers of Lake Superior charcoal for shipment by water are hastening to purchase any odd lots they may require.

Buffalo. Although Southern furnaces have been forced to advance prices still further on account of being heavily oversold, Northern and Eastern irons have not sympathized further than to be remarkably firm.

Louisville. The developments of the past week have been such as to give further confidence, but furnaces appear conservative and apparently do not wish prices unwisely advanced and the small increase that has already been made can no doubt be maintained. While stocks have been materially reduced (and will doubtless continue to diminish if conservatism prevails) the output is increasing and many plants now idle are ready to blow in as soon as signs indicate a probable profit. With prices kept at a reasonable level until available stocks have been largely cut down, the improvement would be more permanent and more advantageous to all, but if prices are hastily and unwisely raised in advance of the real merits of the situation, it would simply encourage excessive production and allow available stocks to remain large.

THE IRON TRADE REVIEW

DEVOTED TO
IRON ORE, IRON AND STEEL MANUFACTURE, MACHINERY, TRANSPORTATION, INDUSTRIAL PROGRESS, STATISTICAL INFORMATION, ETC.

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OCTOBER 20, 1892.

AN INDUSTRIAL TALE OF TWO CITIES.

Late census bulletins give the gist of the industrial returns for Chicago and Cleveland. When put beside those for 1880, the figures for 1890 tell a story of wonderful growth and suggest some interesting inquiries. That the comparison may be more readily made we arrange the returns for the beginning and end of the decade in tabular form:

	1880.	1890.	Per cent. Increase.
CHICAGO.			
No. establishments	3,519	9,959	183.
Capital	$68,836,885	$292,477,038	325.
Hands employed	79,414	203,108	159.
Wages paid	$34,653,462	$119,146,357	244.
Average yearly wages	$436.36	$586.61	34.4
Cost of materials	$179,209,610	$386,814,848	115.
Value of product	$249,022,948	$632,184,140	154.
CLEVELAND.			
No. establishments	1,005	2,300	128.
Capital	$19,430,981	$56,326,496	190.
Hands employed	21,724	48,771	124.
Wages paid	$8,502,935	$27,596,408	224.
Average yearly wages	$391	$569	45.5
Cost of material	$31,629,737	$59,763,062	90.
Value of product	$48,604,050	$104,199,169	114.

The most striking point in the above is that Cleveland, while showing a smaller percentage increase than Chicago in every other item, presents the remarkable record of an increase of 45.5 per cent. in average yearly wages, against an increase of 34.4 per cent. for Chicago. But either record is notable in this regard. While political statisticians will make broad claims for this or that economic policy, the fact doubtless is that no one cause, but a combination of causes, has produced this result. There will certainly be no exponent of Free Trade rash enough to claim that the figures carry the faintest suggestion of an argument for the industrial policy he would inaugurate. On the contrary, we believe that they demonstrate with new emphasis that Protection is in large part a question of wages.

That there has been in the last decade a large increase in the average wages of industrial employes in the United States, is the inference from the difference between the percentage increase in hands employed and in aggregate wages paid. In Chicago 159 per cent. more persons were employed in manufacturing establishments in 1890 than in 1880, and in Cleveland 124 per cent. more; while the increase in payrolls was *244 per cent.* for Chicago and *224 per cent.* for Cleveland. The approximate agreement of these figures in the two cities is most significant.

Another suggestive feature of the tabulation is the relation cost of materials bears to value of product. In Cleveland, for example, the shipbuilding industry, which has developed prodigiously in the decade, has done much to increase the value of product as compared with cost of materials, since labor in shipyards is about 50 per cent. of the value of the completed vessel. That skilled and high-priced labor has been a growing factor in both cities, in the decade, is evidenced by the fact that, in Chicago, cost of materials was 72 per cent. of value of product in 1880 and only 61 per cent. in 1890; that in Cleveland cost of materials was 65 per cent. of value of product in 1880 and only 57 per cent. in 1890.

HOW THE PIG IRON DUTY IS ADDED.

President H. A. Crawford, of the Sligo Furnace Co., whose charcoal furnace is at Sligo, Mo., has renewed a little open correspondence he had with Roger Q. Mills, four years ago. In the campaign of 1888, Mr. Mills made the statement that the $6.72 duty on a ton of pig iron went into the American blast furnace proprietor's pocket. Mr. Crawford made Mr. Mills a proposition to accept $1.50 a ton profit on all the pig iron the Sligo Furnace Co. could turn out in 1889. Mr. Mills did not accept. This year Mr. Mills has been repeating some of the statements he made four years ago and Mr. Crawford, through a St. Louis paper, returns to the subject with this proposition:

Our company will contract with Mr. Mills, or any responsible party he may be willing to back, for the labor entering into the cost of making a ton of pig iron at our furnace, on the following basis:

For chopping the wood for charcoal, 85 cents; for converting the wood into charcoal, $2; for hauling the charcoal to the furnace, $1.50; total labor for fuel used, $4.35 per ton.

For mining the iron ore required to make one ton of pig iron, $3; for hauling same to furnace, $1; total labor for ore used, $4 per ton.

For quarrying the limestone to make one ton of pig iron, 7½ cents; for hauling same to furnace, 12½ cents; total labor for limestone used, 20 cents per ton.

For labor at the furnace, as stated by Mr. Mills, $1.25 per ton.

We will furnish the land with the timber standing on it, furnish the land with the iron ore deposits thereon, and the land with the limestone quarry on it, all free of expense to Mr. Mills. Hence, our proposition is for the labor only entering into the cost of a ton of pig iron, $9.80.

It is true these items now cost us more than we offer to pay Mr. Mills, but as it is $8.55 per ton more than he states as the labor cost, and as our product is about 15,000 tons per year, he can make the snug sum of $128,250 a year clear profit by accepting this proposition—if his statement is correct—and it will enable him to gain some practical knowledge about a subject his utterances evidence he knows little of. Possibly a consideration of this proposition will enable him to find out that the $6.72 per ton does not go into the manufacturer's pocket, if he will reflect that pig iron is now selling at some points in the United States for less money per ton than the figures offered above. This proposition is open for prompt acceptance. We mean business.

It happens rightly that Mr. Mills' own Southern friends are in the best position to controvert his assertions about the addition of the duty to the price of pig iron in this country. He would scarcely have had the hardihood to make the statement credited to him, had he read the recent editorials in Southern trade papers, figuring on the possibilities of shipping Southern pig iron to England and competing at British docks with pig iron from interior furnaces. Had he been a close student of the pig iron market, as he is not, he would have read of Southern iron sold within two months, at $1.25 a ton less than the quotation on Middlesborough iron. Whether that Southern iron could be sold to mills on the British coast would de-

pend altogether on whether the freight from the nearest English blast furnace to the coast is more or less than the difference between $1.25 and the ocean freight on a ton of Alabama iron. Mr. Mills will not accept President Crawford's last proposition any more than he accepted the proposition of four years ago, that would have permitted him to pocket all over $1.50 profit on every ton of pig iron run from the Sligo company's stacks.

THE LOW PRICE OF OLD RAILS.

A correspondent of the St. Louis *Age of Steel*, who doesn't deny an interest in the old iron rail market, says that the recent drop in the price of old rails from $23 to $17 "was simply managed through the pooling of some consumers, whereby other consumers' news of the market were affected and brought into accord, and the fall in prices made possible." As a counter to this movement he hints that a syndicate may be formed to buy all the old rails offered, or at least a controlling proportion of them. He contends that there has not been any decrease in the use of old rails within the past year and a half, that can be traced to the substitution of steel for iron. This assertion he bases on the statement that no additions have been made in the past 18 months to the articles made from steel, that were formerly made from iron—that the conspicuous changes from iron to steel took place more than two years ago. But he seems not to consider that there has been a largely increased use of steel, in these 18 months, in the manufacture of articles in which steel had been supplanting iron before. This would have the same effect, as far as the demand for old rails is concerned, as if there had been additions to the field of steel.

This correspondent is confident that with bar iron higher than one month ago, and with no drop in the price of other forms of manufactured iron, while mills are busy the country over, there will be a recovery in old rails, adding that "$23 per ton is their true value, f. o. b. cars at East St. Louis." By like reasoning, we should predict an early advance in the price of raw Bessemer because billets have been higher in the past six weeks than at any time in the year.

The fact seems to be that there is a much greater supply of old rails in the country to-day than there is any market for. Whether supply has increased beyond the usual or demand has shrunken, matters little, except that the latter alternative involves a longer continuance of the low range, if we accept the very probable explanation of the increasing substitution of steel.

After throwing overboard the "Procession of the Centuries," with its 24 symbolical floats, the committee in charge of the dedication ceremonies at Chicago, this week, produced a programme that fully measured up to the occasion, in dignity and circumstance. When this paragraph comes to the eye of *Iron Trade Review* readers the dedication will be of the past tense. The reception to Vice-President Morton, at the Auditorium hotel, on Wednesday evening; the parade of Thursday with its 50,000 members of civic societies in line, and the more notable procession of Friday, in which National and State officers and distinguished guests, home and foreign, will have part, with all the functionaries who have had charge of the gigantic undertaking from the beginning, under escort of State and National troops—all these will make an event unique in the history of the country. The dedicatory oration by Hon. Wm. C. P. Breckenridge, and the Columbian oration by Hon. Chauncey M. Depew, with all the other literary features of Friday's programme at Jackson Park, make a combination whose rarity matches that of the celebration. To be sure, the great American people must stand without the big park on Friday, but they will be well represented by the 90,000 privileged guests for whom seats are provided in the Manufactures Building.

There are indications that the Homestead strikers are beginning to appreciate what the general public has known for a long time—that the strike is a failure. The leaders reiterate the oft-told tale of unwavering lines, but a number of the old men are reported to have gone back to work in the past few days, and the departure of a large number of skilled workmen to New Castle, to enter the new steel mills, has reduced the effective agitating force at the seat of trouble. The appointment of Superintendent John A. Potter to be chief mechanical engineer of the Carnegie Co., and the transfer of Chas. M. Schwab from the superintendency of the Edgar Thomson works to succeed Mr. Potter, are interpreted by members of the advisory board to mean that the company is preparing to offer a settlement, but the fact doubtless is that the company chose this particular time for the change, which has long been in contemplation, because it considered that the Homestead trouble was completely taken care of and that Superintendent Potter could therefore be spared. Mr. James Gayley has been appointed superintendent of the Edgar Thomson works, and Mr. D. G. Kerr superintendent of furnace department.

Furnaces are being pushed to their utmost now. Number in blast is less than ever a criterion as to output. Ore producers, pig iron makers, iron and steel manufacturers are crowding production so as to make the divisor of their fixed charges the largest possible, and the quotient representing a ton's cost, apart from labor, the smallest possible. With only two furnaces more in blast Oct. 1, than on Sept. 1, the weekly capacity increased 4,974 tons according to the Pittsburg figures, or 6,379 by the New York figures.

It is surprising that that rare artist, the writer of attractive and taking advertisements, has not been allowed to impress his genius to a greater extent, upon the advertising pages of trade papers. The scarcity of his product is the more reason why the inventor of striking and out-of-the-ordinary advertising would score a hit in trade journalism. Live manufacturers appreciate originality, whether it be in boilers or engines, or in the letter press that tells of their advent in the power world.

Chicago's smoke preventing machinery is grinding away in a very methodical fashion. The punitive machine, in particular, is well geared and operates with a minimum of friction. At a recent session of one justice's court about $1,500 worth of fines were imposed, railroads paying $10 for each smoking engine, and manufacturers $50 a smoking stack. These fines represent a fair interest on the cost of a smoke-preventing device.

The *Wall Street Journal* has discovered that "the bottom has fallen out of iron ore," and that "sales were made last week at from 50 to 75 cents a ton below the prices of last year." The downright freshness and newsiness of this discovery about the bottom of the iron ore market are only paralleled by the accuracy of a Cleveland ore market

report that tells of the sale of "good Bessemer iron (*sic*) as low as 5 per cent. (*sic*) in phosphorus."

THAT the grain of foundry pig iron is not to be implicitly relied on as an indication of its quality, is the experience of Manager Clymer, of the Allentown (Pa.) Iron Works, as set forth in his paper before the Mining Engineers, at Reading last week. In another column we print the paper entire.

AT present prices, imported pig iron would find competition before it had gone far from tide-water, even were the duty removed. Yet we are continually told, and the statement is adhered to with a persistence worthy the truth, that the duty is always added to the price of the imported product.

MINING ENGINEERS' SCHUYLKILL MEETING.

The Schuylkill Valley meeting of the American Institute of Mining Engineers will go down as one of the completest successes, from the social as well as the technical standpoint, in all the list of the organization's notable meetings. There were upwards of 150 members present, and two-thirds of these had gathered at the Neversink Mountain Hotel, Reading, on the evening of Oct. 11, when the sessions opened. President Birkinbine, in his opening address, dwelt at length on the resources of the region about Reading. As early as 1716, iron works were in operation within 15 miles of Reading, and near Pottstown an early blast furnace was blown in—the Colebrookdale—whose charcoal iron sold as low as $15 a ton in gold in the early '50s, a statement that Mr. Birkinbine considered to have some consolation in it for the furnacemen of to-day. The Warwick furnace, near Pottstown, built in 1738, remained active 130 years. It was considered one of the largest in the country, being 32 feet high, with a bosh of 7 feet 6 inches to 9 inches, and was blown with wooden bellows and produced from 25 to 30 tons of pig a week. The modern Warwick furnace, 70 feet by 16 bosh, averages 750 tons a week and has made 875 tons. The Robesonia furnace plant has taken the place of the old Reading furnace, built just a century ago, and its grant of "sufficient ore for one furnace," taken from the Cornwall ore hills without royalty, is perpetual.

President Birkinbine said that the resources of the Schuylkill Valley seemed far from exhaustion, the production approximating 12,000,000 tons of coal and 600,000 tons of raw metal and an equal amount of rolled iron and steel.

At the opening session two papers were read: by N. B. Wittman, of Birdsboro, on the "Brown Segmental Wire Gun," and by W. J. McGee, on the work of the United States Geological Survey.

Wednesday morning's session opened with a paper by Frank A. Hill, of Dunbar, Pa., on the fire in the Hill Farm Parish mine in 1890. E. V. D'Invillers, of Philadelphia, and R. P. Rothwell commented on the paper. Joseph Hartshorne, of Pottstown, gave an interesting detailed description of the basic Bessemer plant of the Pottstown Iron Co., and the result of experiments made in the operations there. J. H. Carpenter, of the Carpenter Steel Works, read a paper on the "Manufacture of Crucible Steel for Projectiles." The manufacture of crucible steel at the Carpenter works was described clearly, and the processes connected with the production of projectiles were detailed. The afternoon of Wednesday was devoted to a trip to the Cofrode & Saylor Iron Works, the Carpenter steel works, the Reading hardware works and the Reading pipe mill. At the Carpenter works a heat was poured and the forging of heavy projectiles was witnessed.

At Thursday's session, the paper of W. C. Coffin, of Pittsburgh, on "The Hugh Kennedy Hot Blast Stoves," was read, in the absence of the author. Manager Edward Cook, of the Warwick Iron Co., referred to the experience of the company since the hot-blast stoves had been introduced and the success with which they had met. He gave statistics of the work done by the three stoves built by the company, and pronounced them the best they had tried.

This was followed by an informal discussion of the paper by different members, some of whom sharply criticised features of the stove. The Kennedy stove is built of fire-brick, and the advocates of the iron stove made a strong criticism of its work, Dr. Raymond leading the debate.

David Baker, of Sparrow's Point, Md., read a paper, printed elsewhere, on the use of the rock drill in opening the tapping hole of a blast furnace. In another column, also, is the paper of Mr. Edward T. Clymer, of Allentown, Pa., on the grading of foundry iron by fracture.

Among other papers read, either in full or by title, were the following: "The Mesaba Iron Range," by Horace V. Winchell, Minneapolis; "The Influence of Modern Improvements in Reducing the cost of Mining," by R. P. Rothwell, New York; "Manganese Steel," by H. M. Howe, Boston.

Montreal was chosen as the place of the next meeting, in February, 1893. Thursday's excursion took in the prominent industries of Pottstown and Birdsboro. On Friday, the anthracite committee took the Institute in charge and a trip was made to Pottsville, Frackville, Shenandoah and Maple Hill, inspecting the collieries and mines.

OVER 6,000,000 KEGS OF HORSE SHOES.

One Branch of Iron Manufacture Not Overdone.

The organization in New York of the Horse Owners' Horse Shoe Co., with offices in New York, and works at Phillipsburg, N. J., gives timeliness to some facts about the demand for horse shoes in the United States, and the returns from their manufacture. Horse shoes that cost $2.50 a keg to manufacture sell in the market for about $4 a keg. These cost the blacksmith $13 a keg to make by hand. Finished horse shoes that cost but little more than others to make, bring a much higher price in the market. There are over 17,000,000 horses in the United States, and at least 9,000,000 are working and driving horses and continuously full shod. To protect their feet would require upwards of 6,000,000 kegs of shoes a year.

The directors of the Horse Owners' Horse Shoe Co. are ex-Senator Blair, of New York; Col. N. T. Sprague, Wm. H. Hazard, A. H. Moore and N. E. Reed, of Brooklyn; Dr. W. S. Janney, Philadelphia; J. L. Barber, manager of the Delaware Rolling Mills, Phillipsburg, N. J. Horse shoes are one article in the iron and steel trade that is not over produced.

A Mill Full of One Man's Invention.

There is probably no industrial plant in the Lehigh Valley so nearly composed of the inventive talent of one man as the Bryden Horse Shoe Works, at Catasauqua. The genius of the establishment is Jacob Roberts, the superintendent. He is the inventor of every machine in the works used for horseshoe manufacture.

The plant consists of two well equipped buildings 184x100 feet and 84x100 feet. The works are being enlarged. When the extension is completed the plant will be one-half larger, allowing a more convenient arrangement of the machinery, and correspondingly increasing the capacity for production.

The horseshoes are manufactured from fibrous steel, whose composition was invented and patented by Oliver Williams, treasurer of the company, about thirteen years ago. The steel is like hickory wood and will bend but not break. It is manufactured in the merchant mills in the Lehigh Valley, and comes in the shape of puddle bars two feet long and three inches.

The bars are heated in puddle furnaces and rolled into bars 20 feet long by a process similar to the rolling of steel rails at the Bethlehem Bessemer mill. The long bars are divided into iron sticks a foot or so long, called horseshoe billets. The horseshoe billets are again heated in furnaces, whence they are put in the bending machine, which with one stroke of its peculiar mechanism bends the straight bar into a horseshoe. Two kinds of shoes are made, the forged and the pressed. The forged is used for the cold shoeing, exclusively by street railway, omnibus and express companies.—[Bethlehem (Pa.) Times.

Hackney Hammers in Canada.

Secretary J. W. Smith, of the Hackney Hammer Co., Cleveland, O., made arrangements on a recent trip to Canada, with Messrs. Stevens, Hamilton & Co., of Galt, Ont., builders of machine tools, for the manufacture of Hackney hammers in Canada. This firm can now supply the Canadian demand for these hammers, and the prospects for business in the Dominion are encouraging.

AMONG THE IRON MINES.

Gogebic Range:—

Ashland ore shipments were 70,134 tons last week, and for the season up to Oct. 13, 1,966,269 tons. Ashland's total is 177,179; Aurora, 275,926; Tilden, 208,092; Iron Belt, 144,741; Palms, 63,381; Brotherton, 90,677; Comet, 35,651; Careys, 44,222; Norrie, 378,418; Newport, 117,250; East Norrie, 168,928.

Vermilion Range:—

Total shipments from Two Harbors last week were 68,980 tons. Chandler stockpiles have been cleared up and shipments of that grade will show a falling off. Total shipments to Oct. 13 from Two Harbors were 1,022,112—Minnesota grades, 426,629 tons; Chandler grades, 581,912; Pioneer, 2,525; Zenith, 11,046.

The Chandler Iron Co. has contracted with the Prescott Steam Pump Co. for an enormous new pump to be used on its property. It will weigh, when set up, 12 tons. It will have a cylinder 14x30 inches, and a 10-inch water compartment.

Menominee Range:—

The Chapin mine began to ship two weeks ago over the Milwaukee & Northern to Pembina and thence to Gladstone over the "Soo" line. A portion of the Chapin product is to go that way hereafter.

The Aragon mine has put out 140,000 tons this year, and will increase that to 174,000 tons by the close of navigation.

The Claire has secured men enough to resume the night shift. Its output for the year, thus far, is 65,000 tons.

The Penn Iron Mining Co. have shipped 314,000 tons this season, and the total output will be about 350,000 by the end of the year.

The Crystal Falls *Diamond Drill* says that the Shafer mine is no longer the property of the Shafer Iron Co., the leases, fee and everything pertaining to the mine having been transferred to the Henry Clay Iron Co. The Himrods, controlling stockholders in the Shafer Iron Co., retain large interests in the new corporation and Mr. Charles Himrod, secretary of the Shafer company, is president. A steady shipment of about 800 tons a day is being maintained, 400 tons of which are taken from the stockpile. The approximate output of the mine this year has been placed at 80,000 tons.

Mesaba Range:—

J. M. Thomas, of the Thomas Furnace Co., Niles, O., is inspecting properties with a view to purchasing.

The officers of the Duluth, Mesaba & Northern have contracted with the Duluth Mfg. Co. to construct 750 more cars, to be delivered before Spring. This will make the Mesaba's ore car equipment 1,150 in all. The new contract will keep the car works busy for three months, and another contract for 1,000 to 1,200 ore cars for another company is pending.

The Lake Superior Iron Co. have made the fourth excellent find. It is in w½ of sw¼, section 31, 58-20, about midway between their developments in section 22, 58-20, and sections 1 and 2, 57-21. They have a pit down in dry, granular ore 35 feet. The company expects to be ready to ship ore from all their mines by May 1, '93.

The *Mesaba Range*, of Merritt, amends the statement of the Iron Mountain *Tribune*, that John B. Weimer secured an income of $36,000 a year in his Ohio mine deal, by saying that Sheridan, Jones and Weimer probably cleared up about that amount together.

The Duluth & Iron Range has put a large force of graders at work on its spur to the Cincinnati mine. The Merritt spur may or may not be built this fall, but the road will build to the McKinley before cold weather.

The Oliver Mining Co. that recently leased and will operate the Mesaba Mountain, at Virginia, has incorporated with $1,200,000 capital. The incorporators are: Henry W. Oliver, Henry R. Rea and Charles D. Frazer, of Pittsburgh; Geo. E. Tener and Edward D. Reis, of Allegheny City, and Edward Florada, of Duluth.

In General:—

Iron ore deposits, said to be rich, have been discovered along the banks of the Des Moines river, near Ft. Dodge, Ia.

The Gunflint Lake Iron Co. has made a contract with the Port Arthur, Duluth & Western road to haul 100,000 tons of iron ore from the Gunflint Lake mines next season, the ore to be shipped in bond to Ft. William and forwarded from that point by boat to Cleveland. The iron is magnetic and assays average from 59 to 63 per cent. metallic iron, most of it being within the Bessemer limit.

In the Gunflint Lake region, in township 65, 4 and 5, it is said that the Gunflint Lake Iron Co.'s operators uncovered a vein of nickel eight to ten feet wide.

Statement From the Springfield Emery Wheel Co.

TO THE EDITOR OF THE IRON TRADE REVIEW:

In the interest of the former patrons of the old Springfield Emery Wheel Mfg. Co., and in behalf of the Springfield Emery Wheel Co., we wish to deny through your columns certain statements made by Messrs. Hydes and Homan to the effect that they were the brains and the capital of the Springfield Emery Wheel Mfg. Co., that they had withdrawn from the same and had taken with them all the patents and patterns, that they are now making machinery and wheels in another concern and that if orders were given to the Springfield Emery Wheel Co., the successor of the Springfield Emery Mfg. Wheel Co., such orders would not and could not be filled.

The facts are that the Messrs. Hydes and Homan were owners of certain machinery and patents designed to facilitate and improve the manufacturing of emery wheels, but when the Springfield Emery Wheel Mfg. Co. was organized, all these machines, patents and patterns were transfered to and became the property of said company.

The Springfield Emery Wheel Co. is a new company and the successor of the old one. All the patents, patterns and records which were the property of the old company are now owned by and belong to the new company. When the new company was organized it was deemed expedient for business reasons to exclude Messrs. Hydes and Homan from any participation in its management and to withhold from them any interest whatever in its property and business.

The Springfield Emery Wheel Co. is now conducting a large business on the old plant and has in its employ all of the principal foremen and mechanics employed by its predecessor, the Springfield Emery Wheel Mfg. Co., and it is in a position to fill and does fill all orders which are sent to it for any class of goods manufactured by the old company.

It takes pleasure in informing its patrons that it has established an agency with M. M. Buck & Co., of St. Louis, Mo., and the Fairbanks Co., of Philadelphia, Pa., in addition to its own store at No. 125 So. Clinton street, Chicago, Ill., at all of which places a large stock of emery wheels and machinery is carried.

It respectfully asks the readers of your columns to take notice of the above statement, and anyone desiring a verification thereof is referred to any of the National Banks in the city of Bridgeport.

THE SPRINGFIELD EMERY WHEEL CO.

BRIDGEPORT, CONN., Oct. 16, 1892.

Splitting Away from the Amalgamated.

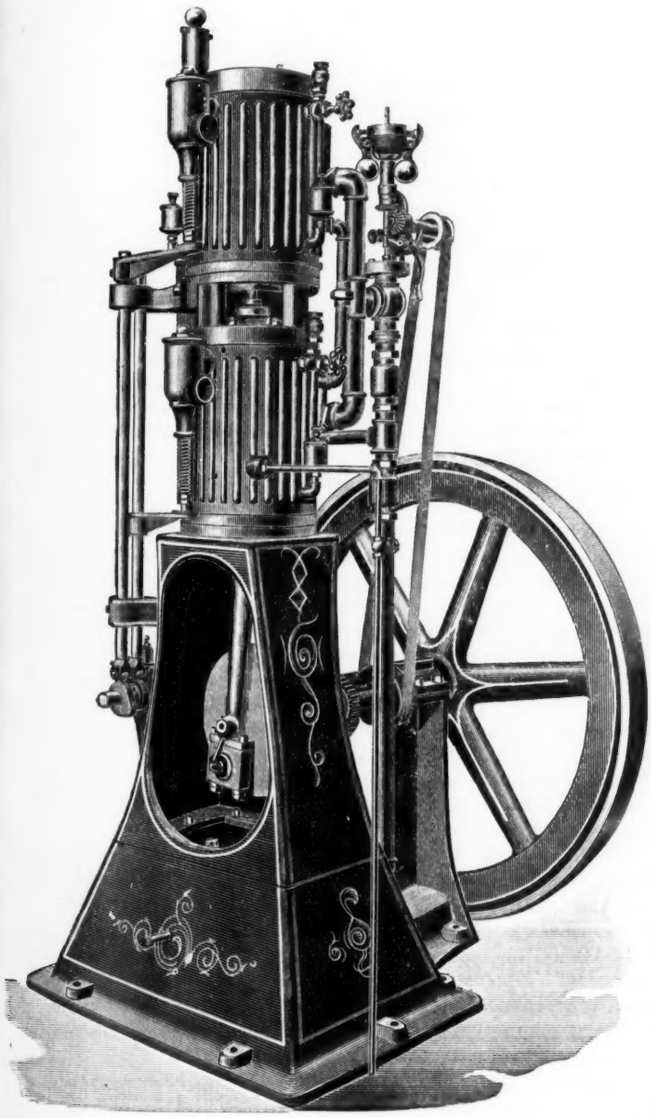
A large representation of the heaters, rollers, roughers and catchers of the two valleys and Pittsburgh met at Youngstown, Saturday, Oct. 15, to consider the formation of an organization apart from the Amalgamated Association. The discussion resulted in the appointment of a committee of five finishers from the valleys and five from Pittsburgh, who are to look over the ground carefully and, if they deem the formation of a separate organization desirable, to report a plan. If the committee decide that the finishers will do better to remain in the Amalgamated Association they will stay. There was a strong sentiment in the meeting in favor of a separate association, on the ground that the Amalgamated Association had not taken care of the finishers, having forced upon them a 10 per cent. reduction.

Wm. Martin, ex-secretary of the Amalgamated Association, and James H. Nutt, of Youngstown, are talked of for the presidency of the new organization.

THE stockholders of the Bristol (Pa.) rolling mills have decided to make an assignment. The liabilities are about $110,000 and assets $70,000. It is said a new company will be formed.

HICKS GAS AND GASOLINE ENGINE.

Mr. John B. Hicks, of Cleveland, a well known inventor and manufacturer of steam engines, has been devoting his energies for some years to the production of a more compact and economical power producer than the steam engine and boiler. As the result of his labors he offers to power users a highly perfected gas engine, for which he claims a number of advantages. As is shown in the illustration, two cylinders set in line, are employed to work alternately, their pistons being on one piston rod, to which an effective impulse is imparted for every revolution of the crank, doubling the power of the engine while adding only the weight of one cylinder and piston (a very small percentage of the whole weight of the engine). By thus doubling the number of effective strokes of the piston a



very much lighter balance wheel may be used with good results.

At the first downward movement of the piston, the explosive compound will be drawn into one of the cylinders, say the upper one, through the valves, which then close and prevent its flowing back into the pipe as the pistons make their up stroke. While the compound in the upper cylinder is being compressed in the upper end of the cylinder the crank shaft passes its upper centre, the charge in the upper cylinder is exploded and the expanding air and gases drive the piston down rapidly and start the engine. When the piston has completed its downward movement and starts upward, the upper escape valve is opened and burnt gases in the cylinder are allowed to escape. On its next downward movement, the piston again draws in a fresh charge of the compound, which is compressed and exploded as before. When the pistons are descending under the impulse of the explosion in the upper cylinder, the lower cylinder is drawing in its charge of the compound to be compressed and exploded, while the upper cylinder is being cleared of the burnt gases and recharged, the two cylinders thus working alternately.

There are many advantages from this construction. Every down stroke of the piston delivers power to the shaft, so that the engine is twice as powerful as one in which every other down stroke, only, is a power stroke. Further, all the power of the piston tends to force the shaft on to the solid parts of its bearing, relieving the cap entirely of wear.

The Hicks engine, moreover, is so simple in construction that it can be made at comparatively low cost. This insures, also, inexpensive renewals. The cost of operation is very low, being limited almost entirely to the cost of gas. At $1 per 1,000 cubic feet for gas, the expense would be but one cent per hour per indicated horse-power. With gasoline at eight cents a gallon, the hourly expense would be less than one cent per horse-power.

The Hicks engines are made of best material and the manufacturers make a strong claim for durability. They are put on the market by the Hicks Gas & Gasoline Engine Works, 26 S. Water street, Cleveland, O. C. L. Newell, proprietor.

"STOCKS ON HAND," ONCE MORE.

In view of some recent animadversions upon the basis of his figures for pig iron "stocks unsold," that appear quarterly in the *Bulletin*, Manager James M. Swank makes this statement in the last issue of his paper:

"In our Annual Report for 1874, giving the statistics of our iron and steel production in that year, we gave for the first time the quantity of domestic pig iron which was on hand and unsold in this country in the hands of the makers or their agents. The phrase *on hand and unsold* was then used by us to mean and was understood by our correspondents to mean exactly what the words imply. Stocks of pig iron which had been sold to foundrymen and rolling mill proprietors, whether removed from the furnace yards or not, were not considered, for the reason that they were *sold* and were no longer to be regarded as pressing upon the pig iron market. From that day to this we have annually and sometimes semi-annually and more recently quarterly collected the stocks of unsold pig iron of domestic production. Our object from the beginning has been to ascertain whether the country was making more pig iron than it was consuming, and if so how much more. We could best accomplish this purpose by ascertaining at stated periods how much pig iron remained unsold in the hands of the makers or their agents. We could not ascertain how much pig iron was in foundry or rolling mill yards, nor could any other agency do this, except in an incomplete and inconsequential and therefore unsatisfactory way. So we have gone on from year to year, giving exact figures of *unsold pig iron* at fixed periods. The manufacturers have known precisely what information our statistics have conveyed. If not comprehensive of all the information that could be desired the stock statistics we have published have embraced all the exact information that had any value for commercial purposes.

"It is of no service to our pig iron manufacturers for jumbling statisticians to mix up stocks of pig iron sold and still in furnace yards with stocks of pig iron which have not been sold, or to ascertain the stocks of pig iron in some rolling mill yards and ignore the stocks in other rolling mill yards and in foundry yards. Figures of the jumbled and incomplete character referred to are not only without any value but they do positive harm by confusing the minds of both buyers and sellers concerning the actual condition of the pig iron market. For commercial purposes they are aggravating, and from any statistical standpoint they are indefensible."

From a "Jobbing" Mill to a "Plate" Mill.

The trouble at the Coleman, Shields & Co. mill at Niles, O., is practically settled. The men had seriously objected to changing this Niles mill, as well as the Valley mill, at Youngstown, from jobbing mills to plate mills, because they manufactured pipe iron, but after the closing of the Niles mill and Col. Coleman's departure for the East, a meeting was held and it was decided to grant the change in classification. The only question open is as to the men whose wages are not fixed by the scale, and the mill will resume as soon as material can be secured.

THE ORIGIN OF MESABA ORES.

State Geologist N. H. Winchell, of Minnesota, read a paper before the last meeting of the American Association for the Advancement of Science, at Rochester, N. Y., discussing the question of the origin of the Mesaba deposits of iron ore. At the outset, Geologist Winchell sets forth the various hypotheses that have been propounded recently in answer to the question he considers. There are five of them. In brief, they may be stated thus: 1. Substitution for limestone. 2. Substitution for carbonate of lime. 3. Concentration of iron oxide from the decay of ferriferous schists or other rock. 4. Accumulation in troughs formed by dykes cutting tilted strata at a somewhat uniform inclination, the iron itself being supposed to have been carried down and deposited by ferriferous waters, replacing a supposed cherty carbonate. 5. Deposition from oceanic solution at the time of the formation of the rocks associated.

The writer taking up the manner of the occurrence of Mesaba ores, gives this general description:

The Mesaba iron range extends, within the limits of Minnesota, a known distance of more than 150 miles, and it is iron-bearing through its whole extent. It commences at the west end of Gunflint lake, on the national boundary, and has been partially explored southwestwardly as far as the Mississippi river near the falls of Pokegama. The iron horizons do not fluctuate in their stratigraphic positions. The iron varies as the character of the accompanying rock varies. It is a duplex range and embraces ores of two distinct origins and kinds.

The more southerly portion of the range, which is made up gabbro hills, contain large deposits of titanic magnetite, and this may be dismissed with the statement that this ore is at present not used, and of little economic concern. This discussion appertains wholly to the more northern belt where the recent remarkable developments have been made. This northern belt embraces non-titanic magnetite and hematite as well as limonite and goethite, or "yellow ochre," as it is sometimes denominated by the miners. The magnetite thus far discovered is not of economic importance, compared with the hematite and goethite, but there are explorations now being made in some of the magnetites which promise to become perhaps equally valuable with the hematites.

The non-titanic magnetite is found in the eastern portion of the range and at a lower horizon in the strata than the hematites, and when it is represented in considerable amount there is little or no hematite in commercial quantities. It is sometimes in close association with the gabbro containing titanic magnetite, and it is a reasonable hypothesis to refer the magnetic quality to the effect of the heated gabbro on the original ore, concentrating the iron by the expulsion of some of the oxygen. Still there is a trace of magnetic ore further west. It is there found in lean iron-bearing rock, and occupies belts of a few inches which pass through the rock in a rather peculiar zigzag or wandering fashion. But still further west the Pewabic quartzite, which is the horizon which holds the magnetite in the eastern end of the range, is again regularly interstratified with magnetite in considerable amount, and as such it has been explored for commercial uses.

Hard hematite is found in the Mesaba range, but it is rather as an accidental appendage of the soft hematite, and usually it grades into low-grade ore and is discarded.

Hard limonite is found in larger quantities than hard hematite. It is apt to be impure, and it occurs in somewhat the same manner as the magnetite—*i. e.*, it branches and permeates a rock bed irregularly, though frequently seen in distant nodules and in vugs when it is found to be a valuable ore.

The hydrated oxide, however, in the form of gœthite is quite abundant. Some shipping mines will depend largely on this ore. The ore is in the form of ochre-yellow powder, or small masses easily reduced to powder. It is found only in the region of the recent new developments, in the western portion of the range.

Soft hematite, however, is the ore for which the 'range' will be celebrated. This has recently been discovered in indefinite and almost incalculable amounts. It is generally amorphous but in lumps, frequently as if a breccia of some sedimentary rock, easily crushed, and it also exists as a granular powder, finer than mustard seed, and can be mined by the simplest methods. The plan now being entered upon for excavating it only requires a steam shovel and a railroad train.

After discussing the stratigraphic relations of the Mesaba ores and going at length into the difficulties connected with accepting any of the proposed theories for the origin of the ore, the paper concludes thus:

There are but two items in conclusion to which we are driven:

First. The Mesaba ore is not satisfactorily explained by any theory that has yet been proposed for it, or for its equivalent (Gogebic) ore on the south side of the great lake. There are some facts that favor all of the theories that have been proposed, but they meet with opposing facts of greater import.

Second. There is but one known cause acting with sufficient force and on a geographic area sufficiently wide, to which we can appeal for the geographic and stratigraphic distribution of this ore—and that is oceanic sedimentation. That there has been a profound change in the sediments since their origination is quite evident; but whether this change took place, in whole or in part, prior to consolidation or after it, is as yet unknown; and if after consolidation it is equally unknown whether it was accomplished in Taconic or in Recent time. There seems to have been something peculiar either in the nature of the sediments of this horizon or in the influences to which they have been subjected, and this peculiarity is expressed on both sides of the lake Superior basin.

NEWS OF THE TWO VALLEYS.

Now that the dispute at the Coleman, Shields & Co. plant, at Niles, has been settled, it is expected that a like difficulty between the Mahoning Valley Iron Co. and their plate mill hands will also be adjusted. The men have made investigation and find that the manufacturers' claim that other mills are running on the basis proposed, is correct. The changing of these mills from jobbing to plate mills only affects the wages of a half dozen men in the department.

It is stated on good authority that the Alice furnace, at Sharpsville, Pa., will soon be put in blast. New scales are being built for the purpose of weighing the molten metal, which will be transferred to the West Foundry for making ingot moulds.

The Sharon Boiler Works, Sharon, Pa., have a large force of men at Spring Valley, Wis., erecting a set of boilers for a large charcoal furnace about to be started.

It is quite probable that Youngstown will, in another year, have a Belt Line Railroad. Considerable capital has been subscribed by various manufacturing concerns. Youngstown has the best railroad facilities of any city of its size in the United States, having the Lake Shore, the Pennsylvania, the Erie, Baltimore & Ohio, Pittsburgh & Lake Erie, and Pittsburgh, Painesville & Fairport Ry.

The Falcon Iron & Nail Co.'s tin plate works at Niles, O., will be ready for operation early in the Spring. The buildings are well under way and the orders for machinery and equipment have all been placed.

The Sykes steel roofing works, of Niles, are working on large orders for roofing and siding. There is a large demand for their product.

The Mahoning Valley Iron Co. are making extensive repairs at their Hubbard mills.

Enterprise Boiler Co., Youngstown, O., are making two portable boilers for Evans City, Pa., and a new hearth and bosh for Tod furnace, Brier Hill, O.

The Hamilton Works, of Wm. Tod & Co., are building two blowing engines for Tod furnace, of the Youngstown Steel Co. They will have cylinders 42″ diameter; air cylinders 84″ and 60″ stroke.

We suppose that those who have the allotment of space at the World's Fair are doing the best they can, but it must be admitted that the course they pursue, as we have previously intimated, has brought about a very general sense of dissatisfaction that can hardly fail to injure the enterprise. But then the people of this country are not much accustomed to running world's fairs, and mistakes are likely to occur. A blunder is hardly a crime, although closely allied to it. It seems to be a fact that prospective exhibitors cannot find what space they can have, or, in fact, that they can have any space. A little more energy on the part of the managers would, probably, produce better results. Matters in respect to the allotment of space are away behind the usual practice in the case of world's fairs.—[American Machinist.

GRADING OF FOUNDRY PIG IRON.

Edward T. Clymer, manager of the Allentown Iron Co., who make a specialty of foundry pig iron at their Allentown, Pa., furnace, read an interesting paper before the Schuykill Valley meeting of the American Institute of Mining Engineers last week on the "Grading of Foundry Pig Iron." As the subject is of importance to *The Iron Trade Review's* constituency we give the paper entire:

It has been the custom, from the earliest time, to grade pig iron by the appearance of the fracture; and although, since the pneumatic and open-hearth methods of steel making have come into existence, chemistry has been called to the assistance of the steel maker in selecting material for his use, the consumers of forge and more especially of foundry iron, still rely almost entirely, as they did a hundred years ago, on the appearance of the fracture of the pig to guide them in the choice of iron. To this rule, however, each year sees more exceptions; and there are now many foundrymen who, recognizing the inadequacy of the old method, are seeking the aid of chemistry and of the testing machine.

It is proposed to confine the present paper to foundry pig iron; for it is in the grading of this product of the blast furnace that the greatest number of errors are believed to arise—errors which are not only the occasion of misunderstandings between the producers and consumers of iron, but which also cause inferior castings and pecuniary loss.

An iron containing enough phosphorus, sulphur or manganese to render it unfit for the foundry, may yet have an open grain. It may have so little silicon that, on re-melting, it will run hard, and yet the grain of the pig may not show it. Again, a close grained iron will often be soft and fluid. It is so obvious, and now so generally admitted by all makers and most users of pig iron, that the appearance of an iron does not infallibly determine its value, that facts and figures to prove this proposition seem unnecessary. The only apology that can be offered for intruding the subject is, that thousands of tons of iron are each year graded by the fracture, and generally by those who would be glad to have some other method assist in part to classify their product.

There are, in fact, few furnace managers who do not use the laboratory quite extensively in determining the quality of iron, and who are satisfied to grade an open iron as No. 1, should it contain too much phosphorus or sulphur, or too little silicon. The furnace manager is consequently often obliged to grade considerable quantities of iron that has the grain of No. 1 as No. 2; and it is annoying to him, beyond what can be well expressed, to grade an iron that is chemically perfect as No. 2 because it is too close in grain to please the eye.

It is desirable to consider what properties of pig iron can be determined by its fracture, and how far this should be taken into consideration in determining quality. My experience has led me to believe that the grain of iron indicates with considerable accuracy the condition of the carbon in the pig; that is, to what extent it is in the combined or in the graphite state—and that as regards other elements nothing can be told with certainty. As already remarked, pig iron may contain sufficient quantities of most of the metals and metalloids to render it unfit for use in the foundry, without the fracture indicating their presence. In large quantities, probably all the impurities of pig iron would make their presence manifest by changing the appearance of the fracture; but before the impurities manifest themselves in this way the iron becomes useless for foundry purposes. An exception to this statement may be made concerning silicon, which often causes a closeness of grain when over 3 per cent is present in the pig, and yet, for certain kinds of castings, it is desirable to have iron containing a large percentage of this element.

While the condition of carbon in pig iron, as indicated by the grain, is an important matter, it is not all important; and when other things besides carbon must be considered and arranged for, to enable the manufacturer to do his work successfully, it is manifestly wrong for the consumer to judge iron entirely by a property which tells but half the tale, and by the indications of which he, himself, will not abide should the material work badly in his foundry.

The question of the quality of pig iron is obviously an important one between the producer and consumer; and the better they can be made to understand each other by a thorough knowledge of the subject, the greater will be the ease and economy with which business will be done. But while the manufacturer should be thoroughly acquainted with the chemistry of iron, which is the finished product, in which all his skill has culminated, it would be unreasonable to expect that all users of pig iron, whose energy is often concentrated on other things, should have a thorough knowledge of metallurgy and of the numerous ways in which the elements that appear as impurities may injure or benefit iron, and may even at times unite to destroy the separate effects of each other. It therefore seems impossible at present to establish any new method, based on chemical analysis, for the universal grading of iron. The manufacturers would, however, be pleased if the consumers of iron would recognize the fact that too much attention has been paid to fracture.

In this matter we have gone in the wrong direction. More attention is paid to grain now than was the case ten years ago. Then one pig out of 20 or 30 served to tell the character of the rest; now every pig is broken and carefully scrutinized.

The pressure to sell in recent years has no doubt caused the growth of this mode of grading, which, appealing as it did to prejudice, enabled those who first practiced the method, to dispose of their product to better advantage, and finally obliged all to follow a custom which hampers the manufacturers of foundry pig, and does not benefit those who use it; but, by inducing them to pay too much attention to a property that is not always essential to good iron, is apt to lead them astray.

It is not the intention of the writer to take up here the chemistry of iron. The effect of the various elements that occur in cast iron has been treated extensively; and the published *Transactions* of the Institute contain much that is valuable on this subject. Mr. Keep's paper in vols. xvii., xviii. and xx., will be found very interesting; as will also Dr. Dudley's "Notes on the Constitution of Cast Iron," in vol. xiv.

It has been pointed out above, how unsatisfactory and trying it is to be obliged to grade foundry pig iron by a method that is now universally admitted to be unreliable. The statement that the grain and color of iron, within reasonable limits, is but an indication of the condition of the carbon, may be considered too sweeping by some; but others will think that, even as to this point, grain is an unreliable guide.

In the recent paper by Mr. Morris, on "The Control of Silicon in Pig Iron," and in the discussion of the same, much that is interesting on grading iron has been said. Mr. Knapp tells us that he has made open-grained foundry iron that contained but ½ per cent. of silicon; and Dr. Raymond points out that the rapidity with which cast iron passes from the liquid to the solid state affects the appearance of the fracture, and defines the grain of pig iron as a physical character. Whatever may be the differences of view on this subject, there seems to be practical unanimity among all who have carefully examined the subject, that the grain of foundry pig iron is not to be implicitly relied upon as an indication of its quality.

The Marine Display at the World's Fair.

It is probable that none of the attractions of dedication day at the World's Fair will be more interesting than the display of shipping in the waters of Lake Michigan at that time. The immensity of the marine interests of the Great Lakes is understood by comparatively few people, but every one in Chicago on the 21st of October will have an opportunity to see, massed, types of nearly all kinds of naval architecture known to the world. It is expected that there will be gathered in Chicago on that day more shipping than can be seen in any other port of the world. And while the number of the U. S. naval vessels will not be large, the mercantile interests will be represented by ships of wood, iron and steel construction, engaged in the carrying of grain, ores and manufactures—indicative of peace and prosperity. And further than this there will be a large number of yachts, both steam and sail, which will add to the general beauty and attractiveness of the spectacle.

The Omaha Barbed Wire Fence & Nail Co. failed for $39,000, a chattel mortgage for $23,000 being given to the Omaha National Bank and one for $16,000 to the Washburn-Moen Mfg. Co., of Chicago. The barbed wire trust has been crowding the smaller producers closer and closer.

CONDITION OF BLAST FURNACES OF U. S.

October 1, 1892.

[CONDENSED FROM THE AMERICAN MANUFACTURER.]

Location of Furnaces.	Charcoal.					Bituminous or Coke.				
	Total No. of Stacks.	In Blast.		Out of Blast.		Total No. of Stacks.	In Blast.		Out of Blast.	
		Number.	Weekly capacity.	Number.	Weekly capacity.		Number.	Weekly capacity.	Number.	Weekly capacity.
New England	13	5	461	8	766	.....	.....	.....	.....	.....
New York	8	2	377	6	812	6	3	3327	3	2110
Pennsylvania	14	5	407	9	793	2	0	0	2	1370
Pittsburgh	.....	.....	.....	.....	.....	24	19	30169	5	5713
Spiegel	.....	.....	.....	.....	.....	2	2	1282	0	0
Shenango Valley	.....	.....	.....	.....	.....	16	6	5869	10	7551
Youghiogheny Val	.....	.....	.....	.....	.....	3	0	0	3	2246
Jun. and Con. Vals	.....	.....	.....	.....	.....	19	8	7166	11	5121
Maryland	8	1	129	7	592	5	1	1267	4	3373
Virginia	9	0	0	9	746	19	13	7809	6	2959
North Carolina	.....	.....	.....	.....	.....	1	0	0	1	100
West Virginia	.....	.....	.....	.....	.....	4	3	2960	1	260
Ohio—Mahoning Val	.....	.....	.....	.....	.....	15	8	8165	7	6485
East, Cent. & North	.....	.....	.....	.....	.....	17	10	9806	7	6141
Hocking Valley	.....	.....	.....	.....	.....	12	2	914	10	2763
Hanging Rock	11	7	585	4	365	13	8	1628	5	1395
Kentucky	3	0	0	3	852	4	2	650	2	1026
Tennessee	6	4	905	2	286	12	6	3787	6	2853
Georgia	4	1	248	3	474	2	0	0	2	1417
Alabama	14	4	1369	10	1965	38	20	14965	18	10824
Indiana	.....	.....	.....	.....	.....	2	0	0	2	325
Illinois	.....	.....	.....	.....	.....	19	12	18555	7	8620
Michigan	22	9	2940	13	3456	.....	.....	.....	.....	.....
Wisconsin	5	2	1182	3	871	4	3	2705	1	427
Minnesota	.....	.....	.....	.....	.....	1	0	0	1	744
Missouri	2	2	663	0	0	5	1	631	4	3165
Texas	4	1	211	3	846	.....	.....	.....	.....	.....
Oregon	1	1	267	0	0	.....	.....	.....	.....	.....
Colorado	.....	.....	.....	.....	.....	3	1	501	2	1103
Total char. and coke	124	44	9744	80	12824	248	128	122156	120	78091
Total anthracite	153	70	29655	83	28296	.....	.....	.....	.....	.....

SUMMARY.

Fuel.	In Blast.						Out of Blast.			
	Number.			Weekly Capacity.			Number.		Weekly Capacity.	
		Month Previous.	Year Previous.		Month Previous.	Year Previous.		Month Previous.		Month Previous.
Charcoal	44	44	59	9,747	9,810	12,710	80	80	12,824	11,971
Anthracite	70	68	87	29,655	28,102	34,594	83	85	28,296	27,167
Bituminous	128	128	159	122,156	118,672	134,514	120	120	77,523	77,001
Total	242	240	305	161,558	156,584	181,818	283	285	118,643	116,139

STURTEVANT SYSTEM FOR FOUNDRIES.

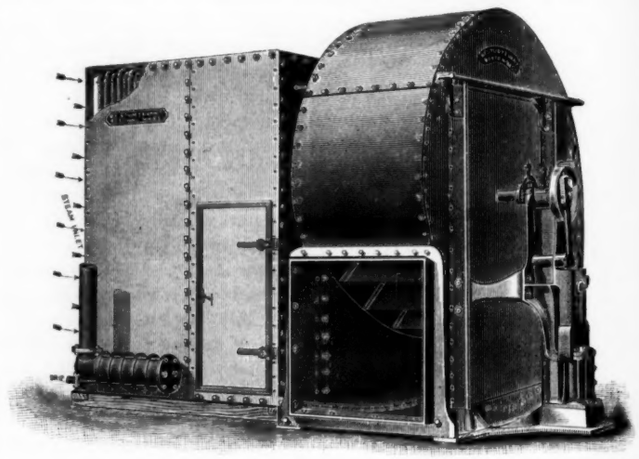
Most of the readers of *The Iron Trade Review* have heard from time to time of the Sturtevant system of heating and ventilating foundries, and no doubt those who have not will be interested in knowing of it. It is a fact, that in the larger foundries throughout the country, particularly the new ones, as much attention is being given to heating and ventilation as to any other details. This matter has been neglected in years past and stoves and a few runs of steam pipes have been thought sufficient for the heating of the foundry. The largest and best concerns are rapidly changing their methods, and among their improvements in foundry construction and fitting is the Sturtevant system of heating and ventilating these buildings.

The practical and thorough heating of the foundry is quite a study and when done properly is without doubt one of the greatest improvements in foundry construction. Among recent noteworthy contracts of the B. F. Sturtevant Co. for their heating and ventilating system are the large new foundries of Frazier & Chalmers, Chicago, Ill.; Illinois Central Railroad, Burnside, Ill.; Brooks Locomotive Works, Dunkirk, N. Y.; Schenectady Locomotive Works, Schenectady, N. Y.; Troy Malleable Iron Works, Troy, N. Y.; Siemens & Halske Electric Co., Chicago, Ill.; Canda Manufacturing Co., Carteret, N. J.; the Lake Erie Engineering Co., Buffalo, N. Y.; Corliss Safe & Vault Door Co., Providence, R. I.; Niles Tool Works, Hamilton O.; Grant Locomotive Works, Chicago.

Among the company's older customers who are using this system for heating and ventilating their foundries are the Southwark Foundry & Machine Co., Philadelphia, Pa.; The Link Belt Machine Co., Chicago, Ill.; Morgan Engineering Co., Alliance, O.; Superior Malleable Iron Co., West Superior, Wis.; Superior Stove Co., West Superior, Wis.; Case Manufacturing Co., Columbus, O.; Robert Poole & Son Co., Baltimore, besides many others.

The Sturtevant Co., have issued a 130-page book entitled, "Five Hundred Representative Buildings, Heated and Ventilated by the Sturtevant System." This they will be pleased to send to any one who may be interested in this subject. The company's works are located at Jamaica Plain Station, Boston, Mass., and they have branch stores at 16 South Canal street, Chicago; 91 Liberty street, New York; 135 North Third street Philadelphia, and 75 Queen Victoria street, London, E. C., where catalogues may be obtained upon application.

The celebrated Sturtevant pressure plower for cupola furnaces is so well known that it is hardly necessary to bring it to our readers' attention, but there are several new and improved designs of these machines which are fully illustrated in the new catalogue. The makers of these blowers are now in a position to furnish a machine which may be driven by one of the Sturtevant special fan engines or with their direct connected electric motor.



Those who are interested in this subject would do well to apply to the manufacturers for further particulars.

ONE of the largest locomotives ever used on the Pennsylvania lines was at the head of the Western express when it arrived at the Union station, yesterday morning. It was built at Schenectady, N. Y., for the company, and yesterday made its trial trip. If the test comes up to the promise made by the manufacturers, a number of such engines will be put on the road. The locomotive has ten wheels on each side, six drivers each two feet six inches high. It weighs altogether 136,000 pounds. The Pennsylvania is constructing at the Altoona shops a still larger engine than this. The drivers will be seven feet, and the weight 140,000 pounds.—[Pittsburgh Dispatch, Oct. 8.

IN the matter of blast furnace repairs, the recent relining of the Phœnix furnace, of the Brown-Bonnell Iron Co., under Superintendent Thomas G. Davis, breaks the record for fast time. The work began at 11:15 A. M., Aug. 3, and at 10:15 A. M., Aug. 8, the relining from bottom to top was completed. The drying fire was started at 4:30 P. M. the following Saturday. When it is understood that such a job usually takes six weeks, and that under Mr. Davis' efficient management it was accomplished in less than five days, it certainly is a fact that he and his men can well be proud of.—[Youngstown (O.) Telegram.

Wide Awake for October is a Discovery number in text and illustrations. The frontispiece, "In 1892," shows a group of children waving their good-bys to Columbus as he sets sail on his quest for a new world. Elbridge S. Brooks gives a brief narration of the Irishman whose presence in the crew of Columbus has been discovered by Mr. John Fiske. Carrie Hyde tells the brief story of the coming of the discoverers from an Indian boy's standpoint. The October number contains, also, the preliminary announcement of special features in the *Wide Awake* for 1893.

OPENING BLAST FURNACE TAPPING HOLES.

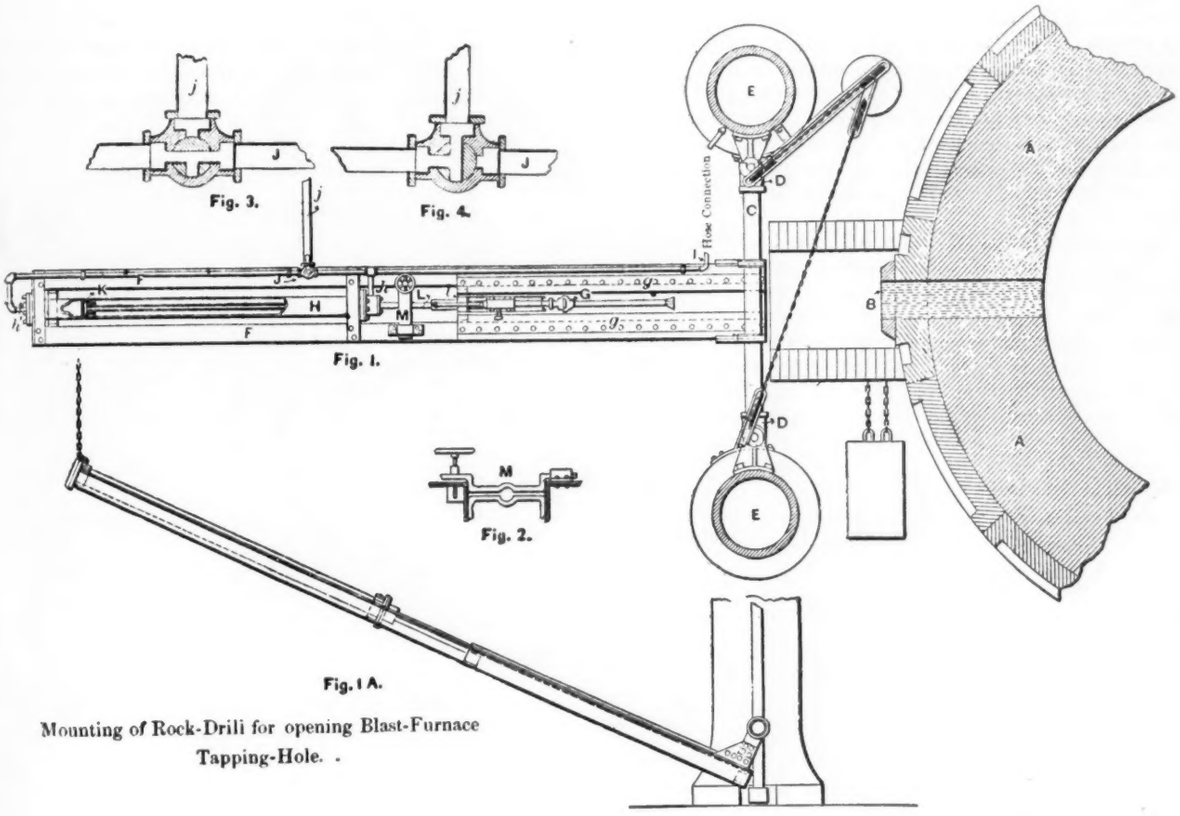
The results of the Maryland Steel Co.'s practice, in the opening of blast furnace tapping holes by the use of the rock drill, are presented in a paper read before the American Institute of Mining Engineers, at Reading, Pa., last week, by Mr. David Baker, of Sparrow's Point. The title, as stated by the author, is "The Rock Drill as Applied to Opening the Tapping Hole of a Blast Furnace." We give the paper entire:

Devices for saving labor in immediate connection with the operation of the iron blast furnace have received comparatively little attention. Machines for hoisting and blowing, always employed in some form, have been improved; but charging, tapping, casting and handling the pig iron in the beds are still performed chiefly by manual labor. At almost all furnaces, filling is done with the hand-barrow of 25 years ago; and it is only recently that, here and there, chills have been employed in the cast-house instead of the usual sand-beds, to lessen the labor of handling the pig, as well as to secure its greater purity.

The manual labor of opening and closing the tapping-hole has been, so far as I know, rather increased than diminished. The enlarged hearths and greater capacity of the modern furnace renders it more difficult to "keep the tap-hole back," as the furnacemen say. In the old-fashioned smaller furnaces, the slacking of the blast-pressure, and the introduction of a single ball of clay, involving (for closed fronts) an average stoppage of not more than three minutes, sufficed for plugging the hole; and opening it was correspondingly easy. No care was taken in the selection of material for the purpose, ordinary brick-clay being found sufficiently refractory. At present, fire-clay, mixed with graphite, is sometimes used, or the material of old black-lead crucibles is rammed in with balls of clay; and, instead of one ball, a wheel-barrow load is often required. Indeed, in "putting in a new hole," three or four barrows of clay-balls, with a barrow of fire-brick, may be required. To make a large hearth safe against "break-outs," the clay stopping should be "kept back" three feet from the outside of the tap-hole.

To open at casting time one of these deeply and thoroughly stopped iron notches requires the labor of eight or ten men, drilling with a heavy bar from 10 to 30 minutes, sometimes even 60 minutes, according to the condition of the furnace. This work is exhausting; and it is usual to call the men from the stock-house to assist in opening the hole, as well as in special work in the cast-house, while the iron is running. Probably the main reason for the general absence of attempts to diminish the manual labor at the tapping-hole has been the presence of a large number of "fillers," available at casting time for work before the furnace. But, on the other hand, this extra work imposed on the fillers has stood in the way of a reduction of their number.

At the blast furnaces of the Maryland Steel Co., the adoption of a new system of furnace-charging rendered it practicable to reduce the labor required for filling; and the contemplated delivery of the molten iron direct to the Bessemer converter would reduce the labor needed in connection with casting. But to insure the full advantage of both these improvements



Mounting of Rock-Drill for opening Blast-Furnace Tapping-Hole.

it was necessary to do away with the requirement of many workmen for hand-drilling at the furnace-front. This consideration led to experiments with the percussion rock-drill as a tap-hole opener.

The first trial was made in the autumn of 1890. The drill employed was the Little Giant, No. 4, of the Rand Drill Co., a somewhat heavier machine than is usually adopted for work in rock. It was mounted on the regular swivel-base, clamped to a horizontal bar, which was swung from a column as a crane. The difficulties with this mounting were the short feed, and the long time required to withdraw the bit, after the hole had been drilled.

We modified this arrangement by increasing the radius of the crane on which the drill was clamped, and by simplyfying the fastening, so as to permit a quicker removal. The results, however, was still unsatisfactory. We burned too many bits.

The present method of mounting, described below, has been entirely successful. The feed is long enough to enable the bit to penterate through the clay-stopping in all cases; and the bit can be retired instantly without danger to it. In case of a very "hard" hole, the withdrawal may be made frequently, and the bit may be cooled in water without greater loss of time than in hand-drilling.

The feeding is accomplished by a cylinder containing a piston and rod attached to the drill where the usual feed-screw or fastened. The piston-rod is hollow, and serves both to feed is

withdraw the drill, and as a channel conveying steam to the operating cylinder.

In Fig. 1, A is a section of a part of the hearth of the blast furnace; B, the tap-hole; and C, a cross-bar arranged with guides to slide on vertical bars attached to the columns E. F is the frame consisting of two parallel angle bars attached to the horizontal cross-bar C. G is the drilling machine which travels in suitable guides bolted to the angle-iron frame. H is the feed-cylinder made of wrought-iron pipe, bored out, or of brass pipe, which does not require boring. I is the supply pipe, which is connected with the pipe at the column by hose or by wrought iron pipe provided with several joints. One branch of the supply pipe I connects with the front head of the cylinder at *h*; the other with the back at *h'*. In the branch leading to the back of the cylinder is placed a three-way cock, J. K is the piston of the feed cylinder, axially cored to allow steam to pass from the front end of the cylinder to the drilling machine. L is the hollow piston rod connecting with the valve-chest of the drill by means of a steel tee and pipe *b*. M is a friction clamp shown in detail in Fig. 2 which grips the piston rod and thus may be used to regulate feed.

The machine may be counterbalanced by weights so as to be easily pushed up by hand when not in use; or the chains may be attached to the piston of a hydraulic or steam cylinder.

While in use the frame stands as shown in Fig. 1; A (an elevation), the angle depending on the condition of the hearth of the blast furnace.

The operation of tap-hole drilling is as follows: When it is time to cast, the frame is lowered to the right position, steam is admitted; and the three-way cock is turned, as shown in Fig. 3. The effective pressure in the rear of the piston being greater than that in the front, the drlll is fed up to the work, but it is prevented from going too far by the clamp, M. A cock in the valve-chest of the drill is now turned and the drilling is begun. The feed may be controlled by the friction clamp.

As soon as the melted iron is reached, the friction clamp is loosened, and the three-way cock is turned into the position as shown in Fig. 4, thus allowing the steam to exhaust from the rear end of the feed-cylinder. This removes the bit from the tap-hole at once, and the tap-hole being open, the machine is pushed up about 10 feet out of the way. In practice we have found it necessary to put a spring in the rear end of the feed-cylinder, to take the shock from the head in case the piston should be allowed to go back so fast as to become uncontrollable.

The advantages of the power-drill over the old hand-drill are:

1. It is much quicker and cuts a better hole; that is, more nearly a true circle. We have found that this tends to make the tapping-hole stand longer against cutting out by the hot iron and cinder.

2. The percussion-drill itself is useful for other puposes. Even when the furnace is out of blast it can be mounted on a tripod and employed, to the saving of much time, in drilling the salamander.

3. The most important saving, however, is the labor before the furnace—the "helpers."

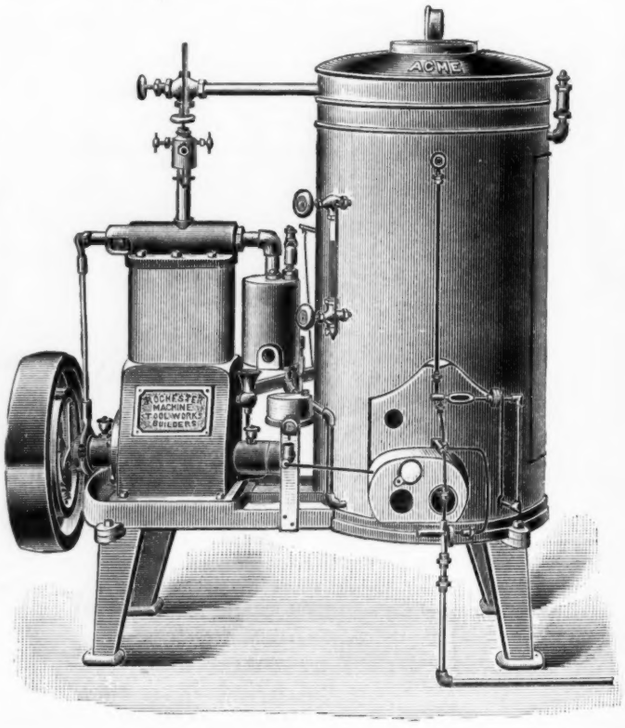
Since the adoption of the steam-drill we have been able to save one man at each turn, or two men a day; and we expect, as soon as the pig-metal is all taken direct to the Bessemer converter, to make a greater saving than is apparent now.

The Coming Steel Rail.

The advances made in the last few years in the metallurgy of steel suggest possibilities that have heretofore hardly been imagined. The manufacture of armor plate of nickel steel, and the treatment of it by the Harvey process and by oil tempering, has resulted in a product so tough that it is very difficult to tool it, and we mentioned last week a nickel steel specimen which had been tested by pulling which gave, with 98,000 pounds tensile strength, 42 per cent. elongation. A rail made of this kind of steel would be practically indestructible. It would also cost a good deal more than any chief engineer would dare recommend. Railroad directors would not be justified in considering posterity so far as to spend a company's money for such rails. But between a nickel steel, oil-tempered rail and the ordinary steel rail of commerce, there is a line of greatest economy which has not even been approximated in rail making.—[Railroad Gazette.

THE ACME OIL-BURNING ENGINE.

The Acme automatic engine, using kerosene oil or natural gas, is an upright, double cylinder, single acting engine, with cranks 180 degrees to each other. It is especially adapted to uses requiring a moderate amount of power, and is manufactured in five sizes, one-half, one, two, three and four horse-power. The pistons being one and one-half times the stroke in length form their own guides, the wrist pins being slightly below the centre of the pistons and the steam rings above and below the wrist pins. The cranks are of steel, of large size, both in diameter and length. The valve is of the baalnced rocking type, of extra long and large wearing surfaces, and is placed on the top of the cylinders, the valve case forming the cylinder heads. This arrangement gives opportunity for long ports, which give quick admission and release, and makes the action of the cut-off governor sensitive to the slightest change in speed or load. The fly-wheel is of cast iron, turned, is perfectly balanced and has within its periphery the automatic



governor, which regulates the admission of steam to suit the varying loads, by changing the throw of the eccentric that accuates the valve.

The claims of the manufacturers for the Acme engine are these: Perfect and continuous lubrication, with no waste of oil; smoothness in running at high speeds, with no pounding from lost motion on the crank; no stuffing boxes to be packed; an automatic shaft governor; that it will not readily get out of order; that it is the only oil burning engine that will successfully run an electric light.

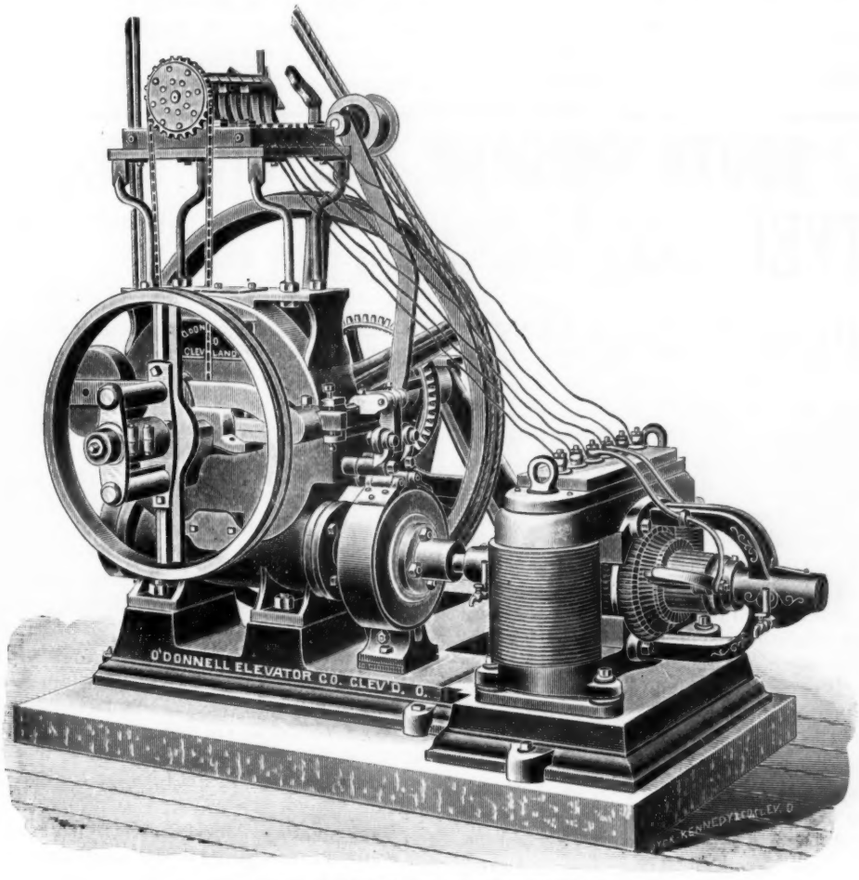
The fuel used is kerosene oil of 110° to 175° fire test atomized by a steam jet and controlled by an automatic fire regulator. A cylindrical tank of galvanized iron 12 inches by 20 inches is supplied for one and two horse-power engines and larger tank for the larger engines. There is an automatic self-closing valve located on the oil pipe, that shuts off the oil when steam is shut off from the atomizer. No extra insurance is required on account of the oil fire.

The Acme engines are manufactured by the Rochester Machine Works, Rochester, N. Y. They manufacture also the Acme stationary engines only and the marine Acme automatic safety engine.

THE force of men is being constantly increased at the Elba Iron Works, Pittsburgh. The furnaces are nearly all in operation. The strikers are doing nothing toward a settlement.

NEW ELECTRIC ELEVATOR ENGINE.

M. J. O'Donnell & Co., of Cleveland, builders of elevators, have put on the market recently an electrical elevator engine, of which the accompanying illustration gives a good view. Several of their elevators, with this electric propulsion, are already in use, and with satisfactory results. The engine consists of a heavy cast-iron bed plate, firmly bolted to a stone foundation. The motor is bolted to this bed plate, also the housing that contains the worm and gear and bearings for worm gear shaft. On the gear shaft which projects through casing is a sheave which is turned a double V groove, this preventing any slipping of the hoisting cables. One end of the cables is fastened to the counter-balance weight and the other to the platform toggle. The brake is operated by a cam



NEW ELECTRIC ELEVATOR ENGINE.

on the shifter-sheave, and attached to this sheave shaft is a sprocket wheel which revolves the arm one-third of a revolution to make the full electric contact on the switch. The motor part of this elevator is designed and manufactured by the Keystone Electric Co., of Erie, Pa.

Why Money Will Continue Easy.

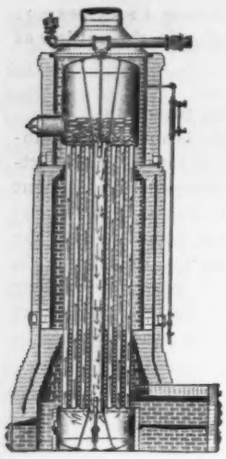
Among the sources of monetary ease in the near or more distant future, there has been a special discussion of the October dividend disbursements, which are rather larger than usual, the total being over $33 millions this year, against $32,262,643 in 1891. The principal of this group of bonds is reported at $794,753,272, the interest being $21,778,087; and of the stocks at $686,385,949, with dividends of $11,323,038. Adding the interest on the National debt and on various county and State bonds, the total disbursements are estimated at $45,750,000, or nearly five millions more than last year. Another point is that the reports of the clearings of the last fortnight throughout the United States are fully up to the average. They amount to $2,199 millions, against $2,677 millions last year, the increase being notably in the Western States, and the decline chiefly due to the extraordinary speculative activity which was developed last year at the Stock Exchange and elsewhere. This is illustrated by the sales at the Stock Exchange, which are reported at 1,743,736 shares last week, against 3,592,895 a year ago; while 16,363,050 bushels of wheat were the aggregate sold, against 33,635,775 in 1891. The indications for the future are supported by the prospects of an increase in the export movements of merchandise and a restriction in the outflow of gold.—[American Banker.

Consolidation of Brake-Beam Interests.

The four largest manufacturers of brake-beams in the country—the Michigan Railway Supply Co., of Detroit, manufacturing the Central brake-beam; the Northwestern Equipment Co., of Chicago, manufacturing the Kewanee brake-beam; the Universal Brake-Beam Co., of St. Louis, manufacturing the Universal, and the Schoen Manufacturing Co., of Pittsburgh, manufacturing the Schoen—have recently consolidated their interests in one company, the incorporation of which under the name of the American Brake-Beam Co., was reported in our columns last week as having taken place in Chicago. The new company will be officered by the officers of the old companies, as follows: H. W. Oliver, of Pittsburgh, president; C. A. Newcomb, of Detroit, vice-president; E. I. Frost, of Chicago, secretary; F. W. Hayes, of Detroit, treasurer; W. A. Pungs, of Detroit, general manager. The headquarters of the company will be in Chicago, where also will be the office of the secretary, Mr. Frost. The office of Mr. Pung, the general manager, is to be in Detroit.

In speaking of the consolidation, one of the officers said that the old companies will continue to manufacture their brake-beams as heretofore, but all the selling will be done through the American Brake-Beam Co. The consolidation was not effected for the purpose of raising prices, but only to reduce the cost of production and to concentrate the business.

OFFICIALS of the Carnegie Co. deny that there has been any transfer to the Bethlehem Co., of contracts for government armor plate held by the former. Vice-Chairman Leishman is quoted as saying: "At the Bethlehem works, only hammering and pressing of plates are done, though I understand they are making preparations to do some rolling. In the case in question there was not even an exchange of work, although occasionally we have had some such understanding with the Bethlehem people. I may add that our works never turned out such good work as last month, and it was serviceable and satisfactory in every respect."



THE AULTMAN & TAYLOR MACHINERY CO.,

MANSFIELD, OHIO, U. S. A.

SOLE BUILDERS OF THE

Cook Patent Water Tube Boiler.

THE ONLY PERFECT WASTE-HEAT BOILER.

No incrustation.
Generates the greatest amount steam with least amount heat.
Repairs reduced to a minimum.
Can be used equally as well for direct firing or with natural gas.

WE ARE ALSO BUILDERS OF

HORIZONTAL, TUBULAR, AND FLUE BOILERS, LOCOMOTIVE, FIRE BOX AND ALL OTHER STYLES OF BOILERS, OIL TANKS AND WATER STAND PIPES.

Estimates furnished promptly on receipt of specifications.

Main Office, 320 The Rookery, Chicago.

SOUTH CHICAGO FOUNDRY CO.,

WORKS, South Chicago.

SEMI-STEEL

Rolling Mill Heavy Machinery and Strong Chilled Castings, Smelting Kettles and Acid-Proof Metal.

INDUSTRIAL SUMMARY.

New Enterprises:—

The following recent incorporations, specially reported for *The Iron Trade Review*, are of interest to the iron and machinery trade:

Pittsburgh, Pa.—Rosena Furnace Co.; capital, $100,000; for the manufacture of iron or steel or both, etc.; incorporators: Jas. B. Oliver, C. D. Frazer, Jno. C. Oliver.

East St. Louis, Ill.—Langer Manufacturing Co.; capital, $60,000; to manufacture and sell tricycles and other vehicles; incorporators: Henry C. Withers, Wm. K. Withers, Henry T. Rainey.

Chicago, Ill.—Penn Cotton Mill; capital, $200,000; to manufacture cotton and other goods, use plant and machinery for same; incorporators: Chas. L. Easton, Chas. P. Platt, Marion Pickett.

Moline, Ill.—Minnesota Moline Plow Co.; capital, $100,000; for wholesale jobbing in agricultural implements; incorporators: Geo. Stephens, Andrew Friberg, G. A. Stephens, Frank G. Allen.

Brownsville, Pa.—The Snowden Manufacturing Co.; capital, $15,000; for the purpose of manufacturing iron or steel, etc.; incorporators: Amariah A. Cormack, Roland C. Rogers, Thos. S. Wright.

Chicago, Ill.—Burn Stamping & Manufacturing Co.; capital, $150,000; to manufacture and deal in metal goods and other merchandise; incorporators: W. H. Burn, Frank J. Stack, W. Knox Haynes.

Chicago, Ill.—Buffalo Brass Co.; capital $30,000; to manufacture and deal in all kinds of brass, tin, copper and zinc articles and goods, etc.; incorporators: Fred R. Babcock, Silas H. Strawn, James E. Ford.

Menominee, Mich.—Menominee Iron Works Co.; capital, $25,000; for manufacturing and repairing machinery; incorporators: J. W. Wells, Wm. Somerville, Edward L. Parmenter, all of Menominee, Mich.

Chicago, Ill.—The Allen-Hussey Co.; capital, $10,000; to manufacture electrical apparatus of all kinds, contract, furnish and put same in buildings; incorporators: Wm. R. Allen, Alfred R. Hussey, Nels. A. Erickson.

Chicago, Ill.—Safety Building & Construction Co.; capital, $1,000,000; for general building and construction business on co-operative plan as contractors; incorporators: Mark Weiler, George E. Williams, Wm. S. Taylor.

Anderson, Ind.—The Arrow Co.; capital, $150,000; for the manufacture and sale of rods, wire nails, and other articles of iron or steel; incorporators: Walter H. Field, Jno. F. Hazen, Geo. E. Day, Wm. L. Finch, Wm. P. Anderson.

Chicago, Ill.—Pennington Aerial Mail, Express & Construction Co.; capital, $30,000,000; to manufacture, sell and operate air ships, machinery, appliances, etc.; incorporators: J. L. McKittrick, James H. Barry, C. O. Tattershall.

New York City, N. Y.—Saugatuck Iron Foundry; capital $30,000; for the manufacture and sale of furnaces, ranges, etc.; incorporators: Mark L. Filley, Saugatuck, Conn., Henry C. De-Rivers, Wm. J. De Rivers, both of New York City, N. Y.

New York, N. Y.—The Self Threading Sewing Machine Co.; capital, $50,000; for the manufacture of sewing machines; incorporators: Chas. W. Weston, Milton, N. Y.; Albert Legg, Milton, N. Y.; J. A. Chanler, 120 Broadway, New York, N. Y.

Defiance, O.—The Clipper Plow Co.; capital, $50,000; for manufacturing and dealing in plows, agricultural implements, etc.; incorporators: P. Kettenring, Jno. C. Woods, Henry B. Harris, Silas T. Sutphen, Olivia B. Hall, Sidney C. Eastman.

Meriden, Conn.—The Standard Hardware Co. (incorporated in W. Va.); capital, $250,000; for manufacturing and dealing in all kinds of hardware; incorporators: B. S. Cowles, Meriden, Conn.; T. E. Davis, E. L. Linsley, J. C. Cable, all of New Haven, Conn.

Manheim, Pa.—The McAnultz Furnishing Co.; capital, $75,000; for manufacturing devices, supplies and appliances needful or relating to flour mills; incorporators: D. L. Hamaker, J. A. McAnultz, both of Manheim, Pa.; H. K. Keller, Lancaster, Pa.

Warren, O.—The Ætna Foundry & Machine Co.; capital, $50,000; for manufacturing and dealing in iron, steel and other metal castings and machinery, wood and metal patterns, etc.; incorporators: H. K. Taylor, H. M. Garlick, L. Booth, O. H. Booth, C. W. Bray.

New York City, N. Y.—St. Clair Contracting Co.; capital, $50,000; general contracting; incorporators: Calvin H. Allen, 1 W. 22d street, New York City, N. Y.; Edwin C. Law, 26 Court street, Brooklyn, N. Y.; Ferdinand M. Theriot, 50 Wall street, New York City, N. Y.

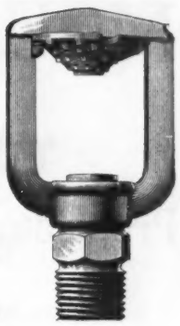
Chicago, Ill.—Jefferson Street Railway Co.; capital, $500,000; to construct, equip and operate street railways in 27th Ward, city of Chicago and adjacent territory; incorporators: G. H. Parker, J. R. Bickerdike, E. E. Eldred, W. T. Thackeray, A. Pregler, A. H. Hill, A. B. Lewis.

Philadelphia, Pa.—The Helios Electric Co.; capital, $100,000; for manufacturing, contracting, furnishing all articles, apparatus, machinery, equipment, etc., for the use and application of electricity; incorporators: D. C. Spruance, Frank Marr, T. J. Johnson, all of Philadelphia, Pa.

New York City, N. Y.—Carroll Box & Lumber Co.; capital, $80,000; for manufacturing boxes, etc., dealing in lumber; incorporators Daniel J. Carroll, 525 W. 14th street, John F. Steinbrenner, 202 W. Houston street, Wm. E. Paine, 202 W. Houston street, all of New York City, N. Y.

Findlay, O.—The Agnew Stove, Roofing & Cornice Co.; capi-

PROTECTING YOUR BUILDING with an automatic fire sprinkler system makes it absolutely fire proof. All Insurance Companies recognize the "Neracher" as the best made and will make liberal reductions on your present rates if you equip. In this way the system pays for itself inside of two years' time. ☞ Write us.



THE NERACHER SPRINKLER COMPANY,

WARREN, O.

BRANCH OFFICES:

Boston, Chicago, St. Louis, Cleveland, Cincinnati, Minneapolis, Pittsburgh, New York, Philadelphia, Baltimore, San Francisco.

tal, $10,000; dealing in stoves, furnaces, house furnishing hardware, etc., manufacturing tin, copper and galvanized iron ware and cornices, etc.; incorporators: Horatio N. King, John Howard Agnew, Jas. F. Agnew, Margaretta L. Agnew, Netta B. Agnew.

News of New Enterprises, Machinery Wants, Etc.:—

There is talk of the erection of a steel rail mill at Kanawha City, W. Va. D. A. Chenowith is interested.

The Union Brass & Metal Co. are putting up two buildings in St. Paul, a $7,000 factory and a one-story foundry.

The Manville Covering Co., of Morristown, Pa., capital, $10,000, will manufacture coverings for boilers and steam pipes.

The loss on Geo. F. Chester's mills, at Lockport, N. Y., is total, and complete power equipment will be wanted in rebuilding.

The Denver (Col.) Boiler & Sheet Iron Works have bought a $39,700 site. Steam boilers, tanks and ore cars are to be manufactured.

A blast furnace is being talked of for Cadillac, Mich., as the Toledo, Ann Arbor & North Michigan railroad would soon be able to bring iron ore direct from the mines.

The Laing Machine Co., incorporated at North Kankakee, Ill., with a capital stock of $20,000. John Laing, A. V. Laing and others are interested. They will soon have a foundry in operation.

The Buffalo (N. Y.) Iron & Steel Co. has been incorporated with $25,000 capital. D. and H. Freedman, James W. Tillinghast, and Eugene Falk, of Buffalo, Frank Scott and George A. McLean, of Pittsburgh, are incorporators.

The Ellwood Steel Co., of Ellwood City, Pa., who are to manufacture sheet steel, report, that they will soon be ready to fill orders. Their contracts for engines, roll trains, etc., are all placed. Buildings are to be 120x60 and 80x140 feet.

The Specialty Wood Working Co., of Warren, O., who will manufacture plain and japanned handles and all kinds of turned wood work, are in the market for lathes. Their plant on North avenue is now building. W. D. Packard is secretary.

Contracts for the building of the National Car Wheel Works at Depew, N. Y., have been let to W. R. Haven, of Buffalo. He also received the contract for the shops of the Buffalo Brass Foundry, at the same place, an enterprise backed by Chicago men.

Ground has been broken at Worcester, Mass., for two of the four buildings which will comprise the new plant of the Rice, Barton & Fales Machine & Iron Co. The machine shop will be 283x80 feet, the foundry 223x80 feet, a pattern house 100x40 feet and a stock shed 223x30 feet. The plant will be occupied by Jan. 15.

The Commercial Electric Co., of Indianapolis, Ind., S. L. Hadley, Secretary, have their buildings up and their apparatus mostly contracted for. They will be in the market for iron, steel and brass castings, phosphor bronze, paints, wire, etc. Ready to fill orders by Nov. 1.

The Ohio Wagon Co., whose factory burned at Muncie, Ind., last week, will probably rebuild, doubling their capacity. They will in that case need a complete outfit of machinery, all their machines and power equipment being literally burned up. The fire was so hot that cast iron melted.

The South Milwaukee (Wis.) Malleable Iron Works, a new enterprise, will be ready to fill orders early next month. They will make malleable and gray iron castings and do all kinds of metal pattern work. The foundry will be 70x130 feet and the annealing house, 50x100 feet. They will need a 50 h. p. engine, a boiler, 60 feet of belting, emery wheels, lathes, bolt cutters and about 60 feet of shafting.

Additions, Enlargements, Removals, Etc.:—

A two-story machine shop 36x36 is a recent addition to the Alamo Iron works, at San Antonio, Tex. About 50 hands are employed.

The Corning Iron Works, of Corning, N. Y., are building a two-story addition to their plant 35x140 feet, made necessary by increasing business.

The Adams Iron Foundry, at Dubuque, Ia., started in August, has been completed. It is 240x85 and built of brick and glass. About 75 men will be employed.

The Newport (Ky.) Rolling Mill Co. have added two plate mills to the plant since they took hold of it and it is expected that three sheet mills will be built next season.

The Chester Steel Casting Co., of Chester, Pa., are building an addition to their foundry, which will be 50x50 feet, a new furnace house 40x40 feet, and a gas house 50x80 feet.

Beloit, Wis., had a business men's and manufacturers' jubilee last week over the completion of the new shop of the Berlin Machine Works. The banquet was served in the works and 800 plates were laid.

Directors of an extensive gray iron foundry of Ohio have been in Milwaukee, a local paper says, negotiating for the removal to that city of their entire plant. The establishment melts 25 tons a day, employs over 300 men and has a capital of nearly half a million.

The Detroit Foundry Equipment Co., of Detroit, Mich., have largely increased their capacity by moving into new

MOUNT SAVAGE FIRE BRICK.

UNION MINING CO.,

Proprietors of the CELEBRATED Mount Savage Fire Brick.

GOVERNMENT ⁜ STANDARD.

Established 1841. Capacity, 60,000 Per Day; 18,000,000 Per Year.

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Home Office and Works:—MOUNT SAVAGE, Allegany County, Md.

Branch Offices:—No. 1 Broadway, New York, N. Y.; No. 222 So. Third St., Philadelphia, Pa.; Lewis Block, Pittsburgh, Pa.

WANTED FACTORIES TO LOCATE AT ALPINE HEIGHTS.

Situated on the Wabash R. R., 23 miles from Chicago's Court House.

CORRESPONDENCE SOLICITED.

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DIAMOND W&B DRILL

THE WHITMAN & BARNES MFG. CO.,

Manufacturers of DIAMOND BRAND TWIST DRILLS.

FACTORIES AT
Akron, O.; Syracuse, N. Y.; Canton, O.; St. Catharines, Ont.

STORES AND WAREHOUSES AT
Boston, Mass.; New York, N. Y.; Philadelphia, Pa.; Cincinnati, O.; Chicago, Ill.; Kansas City, Mo.; San Francisco, Cal.; London, Eng.

works. They are manufacturing the Whiting cupolas, ladles and cranes of all descriptions. Their works are operating to their utmost capacity and orders are plentiful.

Fires and Accidents:—

The brass foundry of the Cox Brass Manufacturing Co., of Albany, N. Y., burned Tuesday, Oct. 10, with $15,000 loss; insurance, $10,000.

At Portsmouth, O., one of a battery of six boilers at the Burgess Steel & Iron Works, exploded, wrecking the rest and seriously injuring three men.

By the accidental discharge of molten metal from a converter in the Bessemer mill of the Bethlehem, Pa., Iron Works three men were badly burned, one possibly fatally. They were in the casting pit, and while a heat was being prepared the vessel tilted as it was raised. Five tons of molten steel splashed over the men.

General Industrial Notes:—

Two Isabella furnaces at Sharpsburg, Pa., will be running at an early day.

The Autumn Iron Co., of Mancelona, Mich., has put in an Edison electric light plant.

An additional 300 tons of steel will be put down on the Indianapolis division of the Pennsylvania lines.

The old Ætna Iron & Steel Works, at Crown Point, Ind., will shortly resume the manufacture of steel castings.

Moline, Ill., is after the Chicago Steel Works, that want room they are not able to command in their present location.

The Wheeler Iron Co.'s two blast furnaces, at West Middlesex, Pa., and the one at Sharpsville, will be in operation by January 1.

The Anniston, Ala., pipe works have an order from Syracuse, N. Y., for 9,000 tons of cast iron pipe, that will keep them running two months.

The Alabama Rolling Mill, at Gate City, Ala., started up Oct. 5, working a force of 350 men. They are rolling from 75 to 90 tons of iron a day.

The Hubbard Foundry & Machine Works, of Hubbard, O., is negotiating with Muncie and Anderson, Ind., relative to removing to the gas belt.

The W. G. Fisher Safe & Range Works, of Kokomo, Ind., have assigned for $56,000. Much of the stock was held in Cincinnati. A reorganization is looked for.

After putting in an additional crucible at their Seventeenth street works. Howe, Brown & Co., of Pittsburgh, now have five running on double turn for the first time in several years.

After an idleness of many years, the large anthracite furnace at Emaus, Pa., is to be put in blast in a few weeks. The balance of the repairs will be made at once.

Miller, Metcalf & Parkin have posted notices in their Crescent steel works, at Pittsburgh, of a 10 per cent. reduction. They employ 800 men and make the finer grades of steel.

The Courtright Hydraulic Machine Co., of 331 Rookery, Chicago, are building the immense pumps, with a capacity of 100,000 cubic feet per second, for the new drainage canal at Bridgeport, Ills.

The Roanoke (Va.) Iron Co. put its rolling mill in operation last week, starting three furnaces. The plant has 32 furnaces with a capacity of 45 tons a turn. The remainder will be started as soon as workmen can be obtained.

The statement is again made that the unfinished plant of the Wattz Iron & Steel Co., at Middlesborough, Ky., will soon be completed. It is said that the plant already cost $1,800,000, and that the $200,000 necessary to complete the work has been raised.

The Bass Furnace Co., of Rock Run, Ala., is enlarging its furnace there. Its height is to be increased from 45 to 52 feet, and its bosh from nine to ten feet. The company is operating its iron mines and accumulating ore, expecting to go into blast by Dec. 1.

The Joliet Sheet Rolling Mill Co., of Joliet, Ill., has confessed judgment for $15,553. David Rosenstein has been appointed receiver. Of the stock, $60,000 has been paid in. Some of the creditors were pressing and it was thought best to stop operations and get affairs untangled.

The Robt. Atchison Perforated Metal Co., of Chicago, report

THE EUREKA IRON AND STEEL WORKS

Offers for sale its entire plant in the

CITY OF WYANDOTTE, WAYNE COUNTY, MICH.

—— Consisting of ——

1st: Complete Modern Charcoal Blast Furnace With shell stack, two (2) Pleyer stoves, capacity of sixty (60) tons per day together with frontage of five hundred (500) feet on the Detroit River docks and ore sheds, suitable unloading steam cranes, smithy, foundry and wagon scales, and large pig iron yard.

2d: Rolling Mill with Dock Frontage Of seven hundred seventy five (775) feet on the Detroit River, extending five hundred (500) feet more or less to Biddle Avenue, the principal business street of the city. The mill contains the following trains of rolls; one plate mill train, 72-inch finishers and 96-inch roughers; one 18-inch bar mill train; one 10-inch train: one 8-inch scrap and muck train with heating furnaces, engines, cranes and all necessary appertunances; six double puddling furnaces; six knobbling fires; steam hammer, squeezer, shears of all kinds, large spare engine with mill accommodations formerly used as a rail mill; together with foundry, gas producers, boiler, machine, carpenter and pattern shops, ice houses, fire brick and fire clay store rooms and stabling locomotives and cars:

3d: Railroad Tracks with Right of Way Conveniently situated connecting both mill and furnace and other establishments with the Lake Shore & Michigan Southern and Michigan Central Railroads.

The above property, by the addition of open hearth furnaces, can be converted into a complete steel manufacturing plant: is most advantageously situated on the banks of the Detroit River about eight miles below the City of Detroit: has complete railroad and water connections with all points, and also half hourly communication with Detroit by steam, motor and boat lines.

Large and commodious office buildings are situated on the premises.

The foregoing property is offered for sale as an entirety,
or, the furnace with its appurtenances, and the mill
with its appurtenances can be purchased separately.

This plant has been recently examined by several leading iron and steel experts, and has been pronounced by them as possessing opportunities for the manufacture of steel unexcelled in this country.

Title Perfect. No Encumbrance. For further information apply to

SIDNEY D. MILLER, Secretary,
80 Griswold Street, DETROIT, MICH.

THE KING BRIDGE COMPANY,

CLEVELAND, O.

Iron and Steel Bridges, Roofs, Girders, Buildings and Structural Work of all kinds, Hoisting and Conveying Machinery for Handling Ore, Coal, Etc.

a very satisfactory business in all branches of their trade. They have recently secured a contract from the Standard Lighting Co., of Cleveland, for all the latter's supply of perforated brass for the ensuing season.

Sealed proposals will be received at the Supervising Architect's Office, Treasury Department, Washington, D. C., until 2 P. M., Nov. 2, 1892, for all the labor and materials required for the trench excavation, foundations, cut-stone work and brick work, iron and wood floor, ceiling, and roof construction, roof covering, etc., for the U. S. Court House and Postoffice building, at Paris, Tex.

Merchant & Co., of Philadelphia, announce that a patent has just been granted them on their new method of copper roofing, which makes all allowance for expansion and contraction of copper, thereby insuring a perfect roof. They will furnish detail drawings and full information on application.

The Supervising Architect, Treasury Department, Washington, D. C., will receive proposals until 2 P. M, Oct. 31, for all the labor and materials required for roof sheathing, slate and copper work of roof, sky-light, down and drain pipes, etc., for the U. S. Postoffice, Court House, etc., building, at Troy, N. Y.

The Attalla Mining & Manufacturing Co., lessees of the Attalla, Ala., ore mines, filed an injunction against S. M. Winchester, of Chattanooga, owner, and the First National bank, Chattanooga, assignee, of royalties. The owner had commenced suit to eject them and they now bring forward counter claims.

The Rau Mfg. Co. have recently removed their works into larger and more commodious quarters. They show a full and complete line of oilers, made in any metal, and make a specialty of the Perfection oiler, with valve attachment to regulate the flow of the oil. The office of the Rau Mfg. Co. is at 235 Lake street, Chicago.

Thirty-two steel workers from Knoxville, Tenn., arrived at Homestead last week. They went South when the boom was on at Sheffield, Birmingham and Knoxville, and now that iron is depressed they had been thrown out of work. They report a general desire among iron and steel workers who went South to get back to Northern mills.

The Lehigh Valley Coal & Iron Co. has brought suit for $20,000 against the West Duluth Furnace Co. The suit grows out of a contract held by the Lehigh company to furnish coke to the Furnace company. The defendants claim that while the agreement calls for Connellsville coke, the coke received is made from a combination of Connellsville and Reynoldsville coal, which they cannot use.

J. J. Rebman, of Knoxville, has been secured as superintendent of the rolling mills of the Ohio Iron Co., at Zanesville, O., and an effort will be made to end the long conflict with the Amalgamated Association by starting the mill with non-union labor. The mill was shut down nearly three years ago, when the former employes joined the Association and the management refused to sign the scale.

The Iowa Iron Works, at Dubuque, have received the contract, at $98,500, from the Navy Department, for the construction of the revenue cutter Wm. Windom, for the Chesapeake bay station. The same works have been awarded the contract for building for the Lucias Ship Co. the first vessel of a new type at a cost of $200,000. It will be 230 feet long, 40 feet beam, and will have a freight capacity of 1,000 tons at seven feet draught.

Where to Locate New Factories

Is the title of a 150-page pamphlet recently published by the Passenger Department of the Illinois Central Railroad, and should be read by every mechanic, capitalist and manufacturer. It describes in detail the manufacturing advantages of the principal cities and towns on the line of the Southern Division of the Illinois Central and the Louisville, New Orleans & Texas Railroads, and indicates the character and amount of substantial aid each city or town is willing to contribute. It furnishes conclusive proof that the South possesses advantages for the establishment of every kind of factory working wool, cotton, wood or clay. For a free copy of this illustrated pamphlet address Mr. J. F. Merry, Assistant General Passenger Agent I. C. R. R., Manchester, Ia. 6

Harvest Excursions via Pennsylvania Lines.

On Sept. 27th excursion tickets to points in the Northwest, West, Southwest and South, and on Oct. 25th to points in the South and Southwest will be sold from principal ticket stations on the Pennsylvania Lines West of Pittsburgh. The Pennsylvania is the desirable route, being direct and offering excellent service. The rate will be low and the advantages afforded via these lines cannot fail to make the journey over them a pleasant one. For details apply to nearest Pennsylvania Line ticket agent or address F. Van Dusen, Chief Assistant General Passenger Agent, Pittsburgh, Pa.

L. K. COMSTOCK.

Consulting Electrical Engineer,
1419 Monadnock Bldg., CHICAGO.

- - - PLANS. - - -
- - - SPECIFICATIONS. - - -
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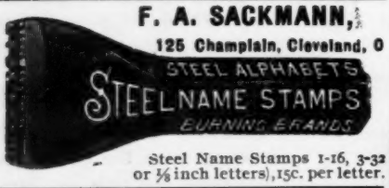
F. A. SACKMANN,
125 Champlain, Cleveland, O



Steel Name Stamps 1-16, 3-32 or ⅛ inch letters), 15c. per letter.

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A No. 8 Rock and Ore Crusher made by the Gates Iron Works, of Chicago, with a large amount of gear wheels, pulleys and shafting. Never been used. As good as new.

THE CANADIAN COPPER CO.,
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Salesman Wanted

That thoroughly understands the wire business.

Address, WIRE 913, TACOMA BLDG.,
Chicago, Ill.

THE RICHEST ON EARTH.

Map of the great Missaba Iron Range made from personal exploration by

D. T. ADAMS.

The only reliable and complete Abstract Map showing the general trend of the iron formation and the location of the different mining companies' lines of railroads, etc., now ready, and will be sent post paid on receipt of price.

Wall Map, $1.00.
Pocket Map Covered, $1.50.
Address,

DULUTH MINING INVESTMENT CO.,
616, 617 and 618 Lyceum Building,
DULUTH, MINN.

The Congdon Brake Shoe Co.

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SMOKE PREVENTION
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CLEVELAND OHIO.

THE STURTEVANT STEEL PRESSURE BLOWERS

For Cupola Furnaces and Forges.

THE STURTEVANT SYSTEM.
—OF—
Heating and Ventilating Manufacturing Establishments

PORTABLE FORGES.

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WE HAVE DROPPED

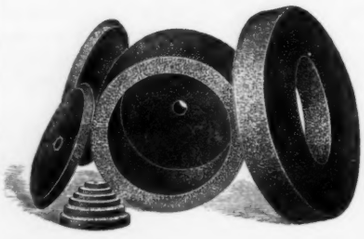
The "Gilbertson's Old Method" Brand of Roofing Plates, and WITHDRAW OUR GUARANTEE.

For Reasons Apply to

MERCHANT & CO.,
PHILADELPHIA, PA.

THE SPRINGFIELD EMERY WHEEL CO.,

MANUFACTURERS OF



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Formulæ of EMERY WHEELS and over 200 different varieties of Emery Wheel Machinery. All goods guaranteed satisfactory.

Catalogue furnished upon application.

The Springfield Emery Wheel Co.,
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OFFERS THE FINEST FIELD FOR INVESTMENT TO BE FOUND IN THE WEST.

FACTORIES EMPLOYING 3,000 MEN

Have been located here within the past four months.

5,000 Additional Factory Hands will be Added within a Year.

The Population of the City, now 15,000, will be doubled within Two Years.

1000 NEW HOUSES ARE NEEDED NOW.

From 15 per cent. to 20 per cent. can be realized from rents, and the rents guaranteed by the manufactories. Fine residence lots for sale on reasonable terms. Call on or write,

THE MUNCIE LAND COMPANY,

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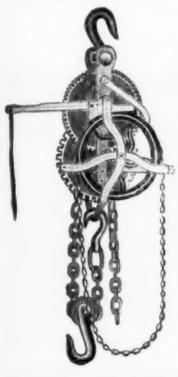
ÆTNA IRON & STEEL CO.,

Bridgeport, - Ohio.

Manufacturers of BARS, ANGLES, TEES, CHANNELS and SPECIAL SHAPES, LIGHT SECTION RAILS, SHEET BARS and BILLETS. SHEETS and PLATES, PICKLED or PLAIN, COLD ROLLED and COMMON FINISH. ANNUAL CAPACITY, 50,000 TONS.



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Warranted Double the Power of any Hoist in the Market of Same Price and Weight.

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ROANOKE, - . VA.

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Also Machinists and Founders. ENGINEERS: C. C. Wentworth and Jos. L Hunter.

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A very interesting and instructive pamphlet on lubrication by means of pure, flake graphite will be sent to all who desire it. It is scientfic and practical.

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- ANTI-FRICTION METALS, - -

- - ENGINES, BOILERS - -

- - - - AND GENERAL - -

- - - - - MACHINERY,

wishing to trade in Canada, will do well to correspond with

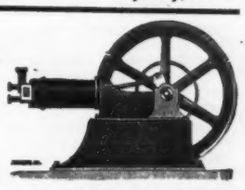
J. C. GARDNER, 66 Canada Life Bldg., TORONTO, CANADA.

POWER From GAS OR CASOLINE.

No Steam, Coal, Ash, Gauges, Engineer nor Danger.

From 1 to 100 horse-power. } **Can be Used in City or Country.**

In conjuction with our Producer Gas Apparatus, we guarantee coal consumption of 1½ pounds per hour per h.p.



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Mines located both east and west of these lands are shipping ore.

Access by rail is assured.

No replies will receive attention unless from parties who are known to be responsible, or who give satisfactory references.

Box 25, Care THE IRON TRADE REVIEW, CLEVELAND, OHIO.

A. LEOFRED,

(Graduate of Laval and McGill,)

MINING ENGINEER.

Main Office: QUEBEC,

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THE AERATED FUEL COMPANY'S SYSTEM

Gives the best oil fire. Does not increase insurance. **200** Plants in use for 50 varieties of work. Forging and tempering a specialty. Send for Catalogue to Hall Steam Pump Co., Pittsburg. **GILBERT & BARKER MFG. CO., General Agents for the U. S., Springfield, Mass.**

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The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) once in three weeks; the parallel (‖) three times out of four.

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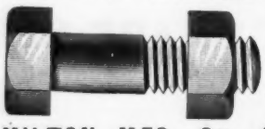
MACHINE BOLTS

Hot Pressed Nuts, Wrought Iron

WASHERS



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IRON ORE.

Extra Low Phosphorus Bessemer	$ 5.50
No. 1 Specular, Bessemer quality	$5.00@$5.25
No. 1 Bessemer hematite	$4.25
Minnesota Bessemer hematite	$ 4.50
Hematites No. 1 non-Bessemer	$3.25@$ 3.50
No 1. Specular, Non-Bessemer	$3.50@$4.00

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	$14 00@$00 00
No. 1 Strong Foundry	14 25@ 14 50
No. 2 Strong Foundry	13 25@ 13 50
No. 1 Grey Forge, red short	13 00@ 00 00
No. 2 Gray Forge, neutral	12 50@ 13 00
No. 1 American Scotch	14 50@ 14 75
No. 2 American Scotch	13 50@ 13 75
Lake Superior Charcoal	17 00
PITTSBURGH (reported by A. H. Childs):	
No. 1 Foundry	$14 25@$14 50
No. 2 Foundry	13 50@ 13 75
Grey Forge	12 50@ 12 75
White and Mottled	12 00@ 12 25
Warm Blast Charcoal	18 00@ 22 00
Cold Blast Charcoal	22 00@ 27 00
Bessemer	13 80@ 14 00
CHICAGO (reported by our representative:)	
Lake Superior Charcoal	$17 00@$17 50
Local Coke Foundry No. 1	14 50@ 14 75
Local Coke Foundry No. 2	13 50@ 14 00
Local Coke Foundry No. 3	13 25@ 13 75
Local Scotch Foundry No. 1	15 00@ 16 00
Local Scotch Foundry No. 2	14 00@ 14 50
Local Scotch Foundry No. 3	13 50@ 14 00
Southern Coke No. 1	14 50@ 15 00
Southern Coke No. 2	13 50@ 14 00
Southern Coke No. 3	13 30@ 13 55
Southern No. 1 Soft	13 50@ 14 00
Southern No. 2 Soft	13 30@ 13 55
Ohio Silveries No. 1	17 00@ 17 50
Ohio Silveries No. 2	16 00@ 16 50
Ohio Strong Softeners No. 1	16 50@ 17 00
Ohio Strong Softeners No. 2	15 50@ 16 00
Tennessee Charcoal	16 50@ 17 00
Alabama Car Wheel	20 00@ 22 00
CINCINNATI (reported by Hyatt, Mathews & Co.):	
Southern Coke No. 1, Foundry	$13 50@$13 75
Southern Coke No. 2 and No. 1 Soft	12 50@ 12 75
Southern Coke No. 3	12 00@ 12 25
Ohio Soft Stone Coal No. 1	16 00@ 16 50
Mahoning Valley No. 1	16 00@ 16 25
Mahoning Valley No. 2	15 00@ 15 25
Hanging Rock Charcoal No. 1, Fdy	19 00@ 19 50
Hanging Rock Charcoal No. 2, Fdy	18 00@ 18 50
Alabama Charcoal No. 1	16 00@ 16 50
Standard Southern Coke, Grey Forge	11 50@ 11 75
Mottled Neutral Coke	11 25@ 11 50
Southern Car Wheel Iron	18 50@ 18 75
Lake Superior Car Wheel & Malleable	17 50@ 18 00
BUFFALO (reported by Rogers, Brown & Co.)	
Mahoning and Shenango Valley, strong, No. 1 Foundry	$15 25
Mahoning and Shenango Valley, strong, No. 2 Foundry	14 25
Ohio Softener No. 1	15 25
Ohio Softener No. 2	14 25
Jackson Co. Silvery, No. 1	17 30
Jackson Co. Silvery, No. 2	16 80
Lake Superior Charcoal	16 50
Tennessee Charcoal	17 00
Southern Softener No. 1	14 15
Alabama Car Wheel	19 00
Hanging Rock Charcoal	20 50
LOUISVILLE (reported by Geo. H. Hull & Co.)	
Southern Coke No. 1 Foundry	$13 50@$14 00
Southern Coke No. 2 Foundry	12 00@ 12 50
Southern Coke No. 3 Foundry	11 50@ 12 00
Grey Forge	11 25@ 11 75
Southern Charcoal No. 1 Foundry	15 00@ 16 00
Car Wheel	18 00@ 19 00
LOUISVILLE (reported by Hall Bros. & Co.):	
Southern Coke No. 1	$13 00@$13 50
Southern Coke No. 2	12 25@ 12 50
Southern Coke No. 3	11 75@ 12 00
Southern Charcoal No. 1	16 00@ 17 00
Southern Charcoal No. 2	15 00@ 15 50
Missouri Charcoal No. 1	17 00@ 17 50
Missouri Charcoal No. 2	16 50@ 17 00
Neutral Coke	11 50@ 12 00
Cold Short	11 25@ 11 50
Mottled	10 75@ 11 00
Southern (standard brands)	20 00@ 21 00
Southern (other brands)	18 50@ 19 50
Lake Superior	19 50@ 20 50
ST. LOUIS (reported by Rogers, Brown & Meacham):	
Southern Coke No 1	$14 25@$14 50
Southern Coke No. 2	13 00@ 13 25
Southern Coke No. 3	12 50@ 12 75
Southern Grey Forge	12 00@ 12 25
Southern Charcoal No. 1	15 00@ 16 00
Southern Charcoal No. 2	15 00@ 15 50
Missouri Charcoal No. 1	14 50@ 15 00
Missouri Charcoal No. 2	14 00@ 14 50
Ohio Softeners	16 50@ 17 00
Lake Superior	18 00@ 18 25
Southern	18 50@ 18 75
Connellsville Coke, St. Louis	5 65
DETROIT (reported by William F. Jarvis & Co.):	
Lake Superior Charcoal, all numbers	$16 50@$17 50
Lake Superior (coke) Bessemer	16 00@ 16 50
Lake Superior Coke, Foundry, all ore	16 00@ 17 00
Standard Ohio Black Band	16 50@ 17 00
Southern No. 1	14 50@ 15 00
Southern Grey Forge	12 50@ 13 00
Jackson County (Ohio) Silvery	17 75@ 18 25

OLD RAILS AND SCRAP METAL.

	GROSS TONS
Old iron rails	$18 00
Old steel rails	12 00
	NET TONS
No. 1 R. R. wrought scrap	$15 00
No. 1 wrought scrap	14 00
No. 1 Machine cast scrap	10 00
Iron axles	19 00
Axle turnings	11 00
Wrought turnings (free from cast)	8 50
Cast borings	6 25
Uncut wrought iron boilers	9 00
Steel boiler Plates	13 00
Grate bars	6 50
Pipes and flues (clean)	9 50
Tank iron	10 60
Hoop and band iron	8 00
Sheet iron	7 00
Wrought drillings	8 00
Malleable iron	9 00

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. mill)	2.10c@2.25c
Angles	1.85c@1.90c
Tees	2.50c
Universal Plates	1.85c
Sheared Plates	1.95c

MERCHANT IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 70
4¼ to 6 by ⅜ to 1 inch	1 75
1¾ to 6 by 1⅛ to 2 inch	1 90
1¼ & 1⅜ by ⅜ to ¾ inch	1 75
1 & 1⅛ by ⅜ to ¾ inch	1 80
⅝, ⅞, ⅞, by ⅜ to ⅝ inch	1 90

Round and Square.

1 to 1⅞ inch	1 70
2 to 2⅝ inch	1 80
2¾ to 3¼ inch	1 95
3⅜ to 4 inch	2 20
4¼ to 4½ inch	2 80
4¾ to 5 inch	3 05

Oval.

⅞ to 1¼ inch	1 90
⅝ to ¾ inch	1 90
½	2 10
⅜	2 30

Half Oval and Half Round.

1½ to 3 inch	2 25
⅞ to 1⅛ inch	2 05
⅝ to ¾ inch	2 30
½	2 45
⅜	3 55

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 80
1 to 1⅜ by ¼ and 5-16 inch	1 85
¾ to ⅞ by ¼ and 5-16 inch	1 95
½ to ⅝ by ¼ and 5-16 inch	2 20

Hoops.

1¼ to 4, Nos. 13 to 15	2 40
1¼ to 2, Nos. 16 to 18	2 45
1¼ to 2. No. 19	2 50
1¼ to 2, No. 20	2 50
1¼ to 2, No. 21	2 60
1¼ to 2, No. 22	2 70
15-16, 1 and 1⅛, Nos. 13 to 15	2 45
15-16, 1 and 1⅛, Nos. 16 to 18	2 50
15-16, 1 and 1⅛, Nos, 19 and 20	2 60
15-16, 1 and 1⅛, No, 21	2 70
15-16, 1 and 1⅛, No. 22	2 80
⅞, Nos. 13 to 15	2 60
⅞, Nos. 16 to 18	2 70
⅞, Nos. 19 and 20	2 80
⅞, No. 21	2 90
⅞, No. 22	3 00
13-16, Nos. 13 to 15	2 70

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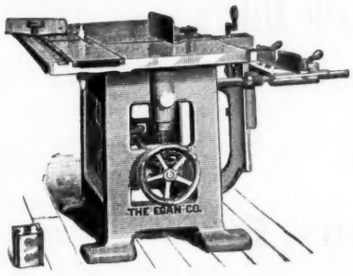
Nos. 251 to 271 W. Front St., CINCINNATI, OHIO.

BUILDERS AND ORIGINATORS, DESIGNERS AND CONSTRUCTORS.

Wood Working Machinery

FOR ANY PURPOSE.

LARGEST LINE IN THE U. S.



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WILL SAW, PLANE, JOINT AND BORE, ETC.
One of the most useful machines in existence.

Pattern and Flask Makers

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THE GRAVES ELEVATOR CO. ROCHESTER, N. Y.

NEW YORK, 92-94 LIBERTY ST. DETROIT, HODGES BUILDING.
BOSTON, 620 ATLANTIC AVE.
2500 IN DAILY USE. CATALOGUE ON APPLICATION.

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MANUFACTURERS OF

Presses, Dies and Special Machinery,

FOR BAR AND SHEET METALS. DIES FOR ALL KINDS OF WORK.

Mention this paper. SEND FOR ILLUSTRATED CIRCULARS.

Oak and Superior Sts., TOLEDO, OHIO.

13-16, Nos. 16 to 18	2 80
13-16, Nos. 19 and 20	2 90
13-16, No. 21	3 00
13-16, No. 22	3 10
¾, Nos, 13 to 15	2 80
¾, Nos. 16 to 18	2 95
¾, Nos. 19 and 20	3 05
¾, No. 21	3 15
¾, No. 22	3 25
11-16, Nos. 13 to 15	3 05
11-16, Nos 16 to 18	3 10
11-16, Nos. 19 and 22	3 20
11-16, No. 21	3 30
11-16, No. 22	3 40
⅝, Nos. 13 to 15	3 10
⅝, Nos. 16 to 18	3 20
⅝, Nos. 19 and 20	3 30
⅝, No. 21	3 40
⅝, No. 22	3 50
⅝, No. 23	3 60

Light Band.

1½ to 6 by ¼ to 3-16 inch	1 95
1½ to 6 by Nos. 11 and 12	2 00
1 to 1¾ by ⅛ to 3-16 inch	2 00
1 to 1¾ by Nos. 11 and 12	2 05
⅞ and 13-16 by ⅛ to 3-16 inch	2 15
⅞ and 13-16 by Nos. 11 and 12	2 20
¾ and 11-16 by ⅛ to 3-16 inch	2 30
¾ and 11-16 by Nos. 11 and 12	2 35
⅝ and 9-16 by ⅛ to 3-16 inch	2 45
⅝ and 9-16 by Nos. 11 and 12	2 50
½ by ⅜ to 3-16 inch	2 60
½ by Nos. 11 and 12	2 65

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	2 20
⅞ inch, " " " " 13 and 14	2 30
¾ inch, " " " " 11 and 12	2 35
¾ inch, " " " " 13 and 14	2 55

Sheet Iron.

No. 10 to 14	2 30
No. 15 to 17	2 45
No. 18 to 21	2 60
No. 22 to 24	2 70
No. 25 to 26	2 80
No. 27	2 90
No. 28	3 55

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 25
C No. 1, " "	2 40
C H No. 1, " "	2 50
C H Flange, " "	3 50
Extra Flange "	4 00
Solid Fire Box "	4 75

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 25
Shell	2 50
Flange	2 75
Marine Flange	3 00
Fire Box	4 00
Above includes plates 90 inches wide.	
90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 116 in. wide,	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs.
1 to 2 in, inclusive	08
9-16 to ½ in. "	08½
7-16 to ⅜ and 2⅜ to 3 in	09
3⅛ to 4 in	09½
⅝ to 11-16 and 4½	10
⅛ to 6 in	10½
¼ to 9-32 and 6⅛ to 7 in	11
3-16 in	13

Flats.

	cts. lbs.
2 to 9-16 in. wide by 2 to ⅝ thick	8

Bessemer and O. H. Steel.

Machinery	base price, 2 35
Tire	" 2 25
Spring	" 2 80
Sleigh Shoe	" 2 50
Toe Calk	" 2 35
Cutter Shoes, tapered and bent	" 2 75

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	4 00
Bridge ½, ⅝, 11-16 and ¾ inch diam	4 00

MACHINERY SUPPLY MARKET.

Anvils.

American	℔ lb 9@10
Wright's	℔ lb 12

Bellows.

Blacksmiths' Hill's	dis 40
Blacksmiths' Bullock's	dis 50&10
Moulders'	dis 40@40&10
Hand	dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 45
Munson's Short Lap Double and Light Double Leather	dis 50
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis 45

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35
Buffalo	dis 40

RAU M'F'G. CO.,

MANUFACTURERS OF

Copper, Brass and Tin Oilers,

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Torches, - - Lanterns, Etc.

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CHICAGO, ILL.

PERFORATED METALS OF ALL KINDS

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WORKS.

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Galvanizing in all its branches, and Manufacturers of Rubber Buckets for chain pumps.

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Stump before a blast. | Fragments after a blast.

STRONGEST and SAFEST EXPLOSIVE

Known to the Arts.

POWDER, FUSE, CAPS,

Electric Mining Goods,

AND ALL TOOLS FOR STUMP BLASTING,
FOR SALE BY THE
HERCULES POWDER COMPANY,
40 Prospect Street, Cleveland, Ohio.
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THE GREAT STUMP AND ROCK
ANNIHILATOR.

Borax.

..... ℔ lb 12½

Chalk.

White.....℔ gross 80
Blue.....℔ gross 85
Red.....℔ gross 70
White Crayon.....℔ gross 12@12½ dis 10

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 25
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 40&10
" Independent Lathe.....dis 40&10
" Universal Lathe.....dis 40&10
" Drill.....dis 35

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Morse.....dis 15
Brown & Sharpe, Milling Cutters.....dis 15
" " Gear Cutters.....dis 15

Crowbars.

Cast Steel.....℔ lb 3½
Iron, steel points.....℔ lb 3½

Drill and Drill Sockets.

Twist Drills.....dis 50&10
Morse Taper and Straight Shank to 1½".....dis 50&10
Morse Taper and Straight Shank Larger than 1½".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150 gr.	Flour, C. F F. FF.
Kegs, ℔ lb	4½c	5 c	2½c
½ kegs ℔ lb	4¾c	5¼c	2¾c
¼ kegs ℔ lb	5 c	5½c	3 c
10 lb cans, 10 in case	6 c	6½c	5 c
10 lb cans, less than 10	10 c	10 c	7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 50@50&5
H. H. Barton.....dis 50@50&5

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 60&10
Hamden.....dis 60&10
Cyclone.....dis 60

Files.

Arcade.....dis 60&10@60&10&10
Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
McClellan.....dis 6 &10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros' Hand Cut.....dis 50
Industry File Works, Hand Cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs.....15c
" " " over 5 lbs.....12c

Jack Screws.

Illinois Bolt Co. list.....dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¼	4	3¾	3½
Hexagon	15½	11½	8½	6	5¾	5¼	5
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ℔ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887.....dis 75
Standard Penny Nails, ℔ keg card rate
Car lots.....$1.70
Less than car lots.....$1.80

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $1.40 ℔ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....℔ lb 9@10
Russia " " .....℔ lb 14
Italian " " .....℔ lb 13@19
Plumbago Piston.....℔ lb 40
Peerless.....℔ lb 60
Morrison's " .....℔ lb 50
Square Flax " .....℔ lb 50
Sheet Rubber.....℔ lb 12&24
Excelsior Rubber.....℔ lb 48
Rainbow.....Full Rolls.....50c ℔ lb
Less than Full Rolls.....60c ℔ lb

For Sale for Cash, or Credit on Car Trust.

20 Second-Hand Standard Passenger Coaches.
30 New Standard Gauge Passenger Coaches, built at one of the best works in the United States. All modern improvements. Price, $3,700 each. Now ready to letter.
40 Second-Hand Narrow Gauge Locomotives, different sizes.
Second-Hand Standard Gauge Locomotives, different sizes.
Second-Hand Box Cars 20 tons capacity, liberal terms.

These Locomotives have been overhauled all in good condition, ready for immediate delivery.
1,000 tons of 40-lb. second-hand steel and iron rails.
800 tons of 35-lb iron and steel rails, second hand.
1,200 tons of 40-lb. iron and steel rails. All these rails are in good order.
Also 9 Sleeping Cars suitable for theatrical purposes, second-hand. 70 Box Cars and 70 Coal Cars, 20 tons capacity each, second-hand.
Southern and Western Delivery.

Agent for Wm. B. Pollock & Co.'s Oil Tank Cars, for sale at lowest possible prices. Photos and and specifications sent with prices if desired. Bonds negotiated on new and old roads. Long roads preferred.

Apply to ALFRED W. LADD,
44 Broadway, NEW YORK.

Estimates furnished for Electrical Equipment under Latest Improvements.

AGENTS: J. H. FALL & CO., Nashville, Tenn.
THOS. P. ALSTON, Esq., 62 East Alabama St., Atlanta, Ga.
G. D. BUSTEMANTE, Birmingham, Ala.

— THE —

Birmingham & Jones Valley R. R. Company,

OF BIRMINGHAM, ALABAMA,

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For information call on or address,

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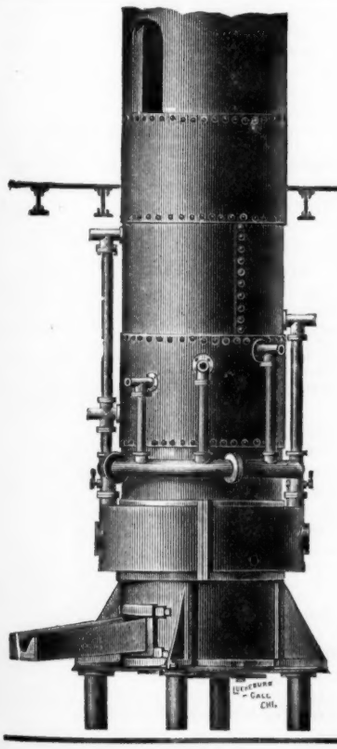
44 Broadway, NEW YORK.



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GREINER
Patent Economical
CUPOLA.

10 to 50 Per Cent. Saving in Fuel,

With Corresponding Increase in Quality of Iron Melted, Over any Existing Cupola.

15 Per Cent Saving Guaranteed.

Can be Applied to any Type of Cupola Now in Use.

400 IN USE IN EUROPE.
U. S. REFERENCES GIVEN.

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SAY! WANT TO TICKLE YOUR TRADE? Send 'em one of our Elegant Specialties. They are PERMANENT "ADS" and indispensable to every Business Man. Complete set samples $1.50, prepaid. Rebate on order of $25.00 or over. Write us.
CLARK & CO., Mfrs. Advertising Specialties in all Materials.
323 AND 325 DEARBORN ST. - - - CHICAGO, ILL.

Eclipse Gasket..... ℔ lb 75

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 40
Medart Pulleys.....dis 50
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17.....dis 40@40&10
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 40@40&10
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....℔ lb 12½
Sisal, ¼ inch and over.....℔ lb 11½

Sand Paper.

B. A. & Co.....dis 50@50&5
H. H. Barton's.....dis 40@45
New England Flint.....dis 50@50&5
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40&10
" Band.....dis 25
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Diston's.....dis 30
Atkins' Circular Saws.....dis 40&45
" Mill, Mulay and Drag Saws.....dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws..... 70c per ft
" Dexter Cross-cuts..... 50c "
" Diamond " ..... 30c "
" Tuttle Tooth Cross-cuts..... 25c "
" One-man Cross-cuts..... 32c "
No. 1 Handles..... 23c per pair
No. 6 " ..... 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—New List 1890.

Flat head iron.....dis 70
Round head iron.....dis 65
Flat head brass.....dis 70
Round head brass.....dis 65
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set. ..... dis 70
Set C. H C. P.....dis 70
Machine, flat head, iron.....dis 65&10
Machine, round head, iron.....dis 60&10
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....per doz 5.25
Hussey & Binns, railroad.....per doz 8 00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list.....dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 55
Pulley Taps.....dis 40

Twine. BC. B.

No. 12, Flax Twine, ¼ and ½ lb Balls.....21c@29c
No. 18, " " ¼ and ½ lb " .....18c@28c
No. 36, " " ¼ and ½ lb " .....16c@27c
2-Ply Hemp, ¼ & ½ lb Balls (Spring Twine).....11½c
3-Ply " 1 lb Balls.....12@12¼c
3-Ply " 1½ lb Balls.....11@11¼c
Cotton Wrapping, 5 Balls to lb.....15@16c

Vises.

Solid Box.....dis 60
Parker's .....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 35

Wire.

New List, Jan. 18, 1884

Brass .....dis 30
Copper .....dis 40
Bright and annealed, Nos. 0@18.....dis 70&10@75
" " Nos. 19@26.....dis 75@75& 5
" " Nos. 27@36.....dis 75&10& 5
Coppered Nos. 0 to 18, market list.....dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis65& 5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....95c ℔ lb dis 30

Wrenches.

Coe's genuine.....dis 50
Girard Standard.....dis 70&10
Agricultural .....dis 75&10
Mechanic's .....dis 55&10& 5
Bemis & Call's Combination.....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 25
William's " " .....dis 25
Alligator " " .....dis 50

BUYERS' DIRECTORY OF IRON AND STEEL TRADES.

Automatic Sprinklers—
Neracher Sprinkler Co., Warren, O.

Advertising Agencies—
G. P. Rowell & Co., New York.

Advertising Specialties—
Clark & Co., Chicago, Ill.

Anti-Friction Metal—
Magnolia Anti-Friction Metal Co., New York.
Grant Anti-Friction Ball Co., Fitchburg, Mass.

Automatic Stokers.—
Brightman Stoker Co., Cleveland, O.

Anglers and Tees—
Aetna Iron & Steel Co., Bridgeport, O.

Architectural Iron Work—
The King Bridge Co., Cleveland, O.

Bolts and Bolt Machinery—
Upson Nut Co., Cleveland.

Boilers and Boiler Attachments—
Babcock & Wilcox Co., New York.
Wm. B. Pollock & Co., Youngstown, O.
E. H. Jones & Co., Cleveland.
The Stirling Co., Pullman Bldg., Chicago, Ill.
Skinner Engine Co., Erie, Pa.
Chas. Miller, Beaver Falls, Pa.
Thos. F. Bishop & Co., Cincinnati, O.
Variety Iron Works, Cleveland.
Weston Engine Co., Painted Post, N. Y.
The Golley & Finley Iron Works, Lima, O.
Brightman Stoker Co., Cleveland, O.
W. C. Leffel & Co., Springfield, O.
Aultman, Taylor Mfg. Co., Mansfield, O.

Blowers—
E. H. Jones & Co., Cleveland.
Brightman Stoker Co., Cleveland, O.
B. F. Sturtevant & Co., Boston, Mass.

Blowing Engines—
The James Leffel Co., Springfield, O.

Bridges—
American Bridge & Iron Co., Roanoke, Va.
The King Bridge Co., Cleveland, O.

Barrows—
Akron Tool Co., Akron, O.
The Kilbourne & Jacobs Mfg. Co., Columbus, O.

Belt Dressing—
White Oak Belting Co., Cleveland.

Belt Elevators—
Lane & Bodley Co., Cincinnati, O.

Brick Machinery—
Straub Machinery Co., Cincinnati, O.

Bars—
Aetna Iron & Steel Co., Bridgeport, O.

Cranes and Derricks—
Wm. Tod & Co., Youngstown, O.

Chain Belting—
Jeffrey Mfg. Co., Columbus, O.

Cupolas—
Victor Colliau, Detroit, Mich.
Greiner Economical Cupola Co., Chicago, Ill.
M. Steele Co., Springfield, Ill.

Cut-off Couplings—
J. H. & D. Lake Co., Hornellsville, N. Y.

Coal and Coke—
W. J. Rainey, Cleveland, O.
F. J. & H. R. Pool, Cleveland, O.

Drilling Machines—
Universal Radial Drill Co., Cincinnati, O.
Aurora Tool Works, Aurora, Ind.

Drop Presses—
Toledo Tool & Machine Co., Toledo, O.
Godfrey J. Bremer, Kalamazoo, Mich.

Drop Forgings—
Palmer, Cunningham & Co., Philadelphia, Pa.

Dripping Machinery—
J. H. Day & Co., Cincinnati, O.

Dynamos for Electro-Plating—
Thos. Buchanan & Co., Cincinnati, O.

Elevators—
Graves Elevator Co., Rochester, N. Y.

Explosives—
Hercules Powder Co., Cleveland.

Emery Wheel Machinery—
J. Wendell Cole, M. E., Columbus, O., or Chicago, Ill.
Springfield Emery Wheel Co., Bridgeport, Ct.

Emery and Corundum Wheels—
Michigan Emery Wheel Co., Detroit, Mich.
Acme Safety Emery Wheel Co., Detroit, Mich.
J. Wendell Cole, Columbus and Chicago.
Thos. Buchanan & Co., Cincinnati, O.
Springfield Emery Wheel Co., Bridgeport, Ct.

Engravers and Electrotypers—
Eclipse Electrotype & Engraving Co., Cleveland.
Union Electrotype Foundry, Cleveland.

Engines (Steam)—
Wm. Tod & Co., Youngstown, O.
E. H. Jones & Co., Cleveland.
Skinner Engine Co., Erie, Pa.
Lane & Bodley Co., Cincinnati, O.
L. Spence & Son, Martins Ferry, O.
Weston Engine Co., Painted Post, N. Y.
Brightman Stoker Co., Cleveland, O.
W. C. Leffel & Co., Springfield, O.

Engines (Gas)—
Otto Gas Engine Co., Chicago, Ill.
Van Dusen Gas Engine Co., Cincinnati, O.

Engineers and Contractors—
E. H. Jones & Co., Cleveland.
Thos. F. Bishop & Co., Cincinnati, O.
Brightman Stoker Co., Cleveland, O.

Electrical Engineers—
L. K. Comstock, Chicago Ill

Engineers' Specialties—
James Jenks, Detroit, Mich.

Ejectors—
James Jenks, Detroit, Mich.

Eave Troughs and Conductors—
J. H. Eller, Canton, O.
Berger Mfg. Co., Canton, O.

Emery Grinding and Polishing Machines—
Thos. Buchanan & Co., Cincinnati, O.

Electro and Nickel Platers' Supplies—
Thos. Buchanan & Co., Cincinnati, O.

Files, Makers of—
A. & H. Gough, Cleveland.
E. K. Morris & Co., Cincinnati, O.

Forges—
Cleveland City Forge & Iron Co., Cleveland.

Foundries—
Harn, Ow & Co., Beaver Falls, Pa.
American Bridge & Iron Co., Roanoke, Va.
Addyston Pipe & Steel Co., Cincinnati, O.
Radford Pipe and Foundry Co., Cincinnati, O.
Lane & Bodley Co., Cincinnati, O.
The Sam'l C. Tatum Co., Cincinnati, O.
J. W. Foley & Co., Cincinnati, O.
Brightman Stoker Co., Cleveland, O.
Congdon Brake Shoe Co., Chicago, Ill.
South Chicago Foundry Co., Chicago, Ill.

Fire Brick and Clay—
J. Downerd & Son Co., Zanesville, O.
J. V. Rose, Sharon, Pa.
Stowe Fuller & Co., Cleveland.
J. J. Shepard, Cleveland,
Union Mining Co., Mt. Savage, Md.

Foundry Supplies—
J. Downerd & Co., Zanesville, O.
J. D. Smith Fdy. Supply Co., Cincinnati, O.
Straub Machinery Co., Cincinnati, O.

Facings & Blackings—
J. D. Smith Fdy. Supply Co., Cincinnati, O.

Flour Mill Machinery—
The Bradford Mill Co., Cincinnati, O.

Furnace Linings—
Union Mining Co., Mt. Savage, Md.

Foot and Power Lathes—
Sidney Machine Co., Sidney, O.

For Sale—
C. S. Morris, Toronto.
Box 25 care Iron Trade Review, Cleveland, O.
Sidney D. Miller, Detroit, Mich.

Fans—
B. F. Sturtevant & Co., Boston, Mass.

Friction Clutch Pulleys—
J. H. & D. Lake Co., Hornellsville, N. Y.

Flue Cleaners—
E. Rayfield, Chicago, Ill.

Gear Cutters—
Palmer, Cunningham & Co., Philadelphia, Pa.

Galvanizers—
H. H. Hodell, Cleveland.

Grindstones—
E. K. Morris & Co., Cincinnati, O.

Glass Boards—
Canton Saw Co., Canton, O.

Gearing
Straub Machinery Co., Cincinnati, O.

Graphite Paint—
Jos. Dixon Crucible Co., Jersey City, N. J.

Heaters and Purifiers—
Stilwell & Bierce Manufacturing Co., Dayton, O
E. H. Jones & Co., Cleveland.
Thos. F. Bishop & Co., Cincinnati, O.
Warren Webster & Co., Philadelphia, Pa.
Brightman Stoker Co., Cleveland, O.

Heavy Hardware—
E. K. Morris & Co., Cincinnati, O.

Hangers, Pulleys and Shafting—
Lane & Bodley Co., Cincinnati, O.
The Sam'l C. Tatum Co., Cincinnati, O.
J. W. Foley & Co., Cincinnati, O.

Hardware Specialties—
The Sam'l C. Tatum Co., Cincinnati, O.

Hack Saws—
Millers Falls Co., New York City.

Hoisting and Conveying Machinery—
The King Bridge Co., Cleveland, O.

Heating and Ventilating Fans—
B. F. Sturtevant & Co., Boston, Mass.

Iron Ore, Bar and Pig Iron—
Oglebay, Norton & Co., Cleveland.
J. H. Outhwaite & Co., Cleveland.
Condit-Fuller Co., Cleveland.
E. C. Pope, Cleveland.
Cleveland Iron Mining Co., Cleveland.
Corrigan, Ives & Co., Cleveland.
Aetna Iron & Steel Co., Bridgeport, O.

Injectors—
Penberthy Injector Co. Detroit Mich.
Eagle Lubricator Co., Cleveland, O.

Iron and Steel Roofing—
Sykes Iron & Steel Roofing Co., Niles, O.
Berger Mfg. Co., Canton, O.
New Philadelphia Iron & Steel Co., New Philadelphia, O.
Porter Iron Roofing & Corrugating Co., Cincinnati, O.
Holton Iron Roofing Co., New Lisbon, O

Investments—
Alfred W. Ladd, New York.
Frank R. Biedler, Baltimore, Md.
Fidelity & Deposit Co., Baltimore, Md.
Duluth Mining Investment Co., Duluth, Minn.

Insurance Companies—
Hartford Steam Boiler I. & I. Co., Hartford, Ct

Improvement Companies—
Muncie Land Co , Muncie, Ind.

Iron Buildings—
The King Bridge Co., Cleveland, O.

Lathes—
H. L. Shephard, Cincinnati, O.
Aurora Tool Works, Aurora, Ind.
The Bradford Mill Co., Cincinnati, O.

Lathe Dogs—
Palmer, Cunningham & Co., Philadelphia

Lathe Tools—
Armstrong Bros. Tool Co., Chicago, Ill.

Link Belting—
The Jeffrey Mfg. Co., Columbus, O.

Lifting & Mixing Machinery—
J. H. Day & Co., Cincinnati, O.

Land Companies—
Muncie Land Co., Muncie, Ind.

Lanterns—
Rau Manufacturing Co., Chicago, Ill.

Lubricators—
Eagle Lubricator Co., Cleveland, O.

Mining Machinery—
Copeland & Bacon, New York.
American Bridge & Iron Co., Roanoke, Va.

Machine Shops—
Toledo Machine & Tool Co., Toledo, O.
Spicer Mfg. Co., New Philadelphia, O.
Harn, Ow & Co., Beaver Falls, Pa.
American Bridge & Iron Co., Roanoke, Va.
Thos. F. Bishop & Co., Cincinnati, O.
Godfrey J. Bremer, Kalamazoo, Mich.

Machinists' Tools and Supplies—
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Armstrong Bros. Tool Co., Chicago, Ill.
Aurora Tool Works, Aurora, Ind.
Cincinnati Milling Machine Co., Cincinnati, O.
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Metal Ceilings—
Fred F. Bischoff, Chicago, Ill.

Municipal Bonds—
Frank R. Biedler, Baltimore, Md.

Moulding Sand—
J. Downerd & Son Co., Zanesville, O.

Milling Machines—
Cincinnati Milling Machine Co., Cincinnati.
Godfrey J. Bremer, Kalamazoo, Mich.

Mill Machinery—
Straub Machinery Co., Cincinnati, O.

Mining Tools.—
Standard Axe & Tool Works, Ridgway, Pa.

Mines and Mining Stock—
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Manufacturing Sites—
W. W. Watson, Chicago, Ill.

Mining Engineers—
A. Leofred, Quebec, Can.

Natural Gas Specialties—
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Oilers—
Rau Manufacturing Co., Chicago, Ill.

Oil Well Machinery—
The Golley & Finley Iron Works, Lima, O.

Oil Tanks—
Aultman, Taylor Mfg. Co., Mansfield, O.

Pumps (Steam)—
E. H. Jones & Co., Cleveland.
Deming Co., Salem, O.
Downie Bros. & Nevin, New Brighton, Pa.
Thos. F. Bishop & Co., Cincinnati, O.
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Aitchison Perforated Metal Co., Chicago.

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Godfrey J. Bremer, Kalamazoo, Mich.
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Pulleys—
Straub Machinery Co., Cincinnati, O.
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Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.
Saws—
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Canton Saw Co., Canton, O.
Second Hand Machinery—
Parkin & Bosworth Co., Cleveland.
Steel Rails, Blooms and Billets—
Cleveland Rolling Mill Co., Cleveland.
Smokeless Furnaces—
J.V.Burke, Chicago, Ill.
Brightman Stoker Co., Cleveland, O.
Steel Stamps and Stencils—
J. H. Fleharty & Co., Cleveland.
F. A. Sackman, Cleveland, O.
Sheet Iron—
Cleveland Rolling Mill Co., Cleveland.
New Philadelphia Iron & Steel Co., New Philadelphia, O.
The Golley & Finley Iron Works, Lima, O.
Aetna Iron & Steel Co., Bridgeport, O.
Sheet Steel—
New Philadelphia Iron & Steel Co., New Philadelphia, O.
Aetna Iron & Steel Co., Bridgeport, O.
Steel Castings—
Chester Steel Casting Co., Philadelphia, Pa.
Aschman Steel Castings Co., Sharon, Pa.
New Castle Steel Casting Co., New Castle, Pa.
Congdon Brake Shoe Co., Chicago, Ill.
South Chicago Foundry Co., Chicago, Ill.
Steam, Gas and Plumbers' Supplies—
A. Harvey's Sons Mfg. Co., Detroit, Mich.
Scrap Iron & Steel—
Klein & Cohn, Cincinnati, O.
Special Machinery—
Toledo Machine & Tool Co., Toledo, O.
J. H. Day & Co., Cincinnati, O.
Godfrey J. Bremer, Kalamazoo, Mich.
Shafting—
Straub Machinery Co., Cincinnati, O.
Stokers—
Brightman Stoker Co., Cleveland, O.
Steel Rails, Blooms and Billets—
Aetna Iron & Steel Co., Bridgeport, O.
Structural Work—
The King Bridge Co., Cleveland, O.
Semi-Steel—
South Chicago Foundry Co., Chicago, Ill.
Twist Drills—
Cleveland Twist Drill Co., Cleveland.
Graham Twist Drill & Chuck Co., Detroit, Mich.
The Whitman & Barnes Mfg. Co., Akron, O.
Torches—
Rau Manufacturing Co., Chicago, Ill.
Turnbuckles—
Cleveland City Forge & Iron Co., Cleveland.
Typewriters—
Wyckoff, Seaman & Benedict, Cleveland.
Tanks—
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Brightman Stoker Co., Cleveland, O.
B. F. Sturtevant & Co., Boston, Mass.
Wood-Working Machinery—
The Egan Co., Cincinnati, O.
Wire Machinery—
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Washers—
Milton Mfg. Co., Milton, Pa.
Water, Gas and Steam Pipe—
Addyston Pipe & Steel Co., Cincinnati, O.
Radford Pipe & Foundry Co., Cincinnati, O.
Wheelbarrows—
Akron Tool Co., Akron, O.
Wood Pulleys—
Great Western Pin Co., Toledo, O.
Water Stand Pipes—
Aultman, Taylor Mfg. Co., Mansfield, O.

CLEVELAND ROLLING MILL CO.,

CLEVELAND, - OHIO.

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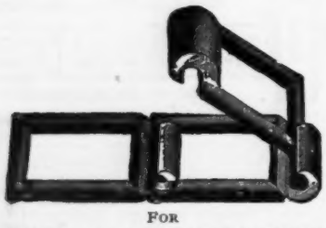

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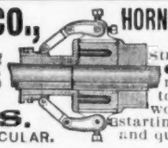

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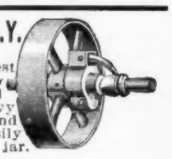

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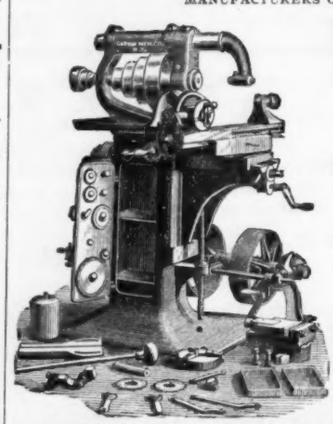

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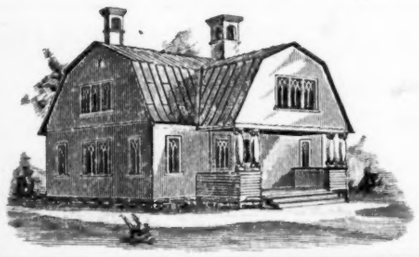

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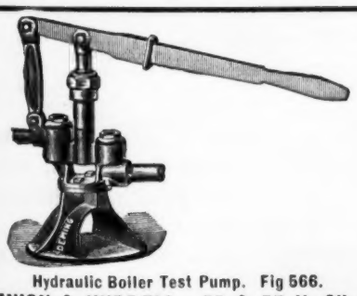
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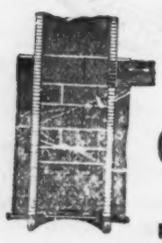

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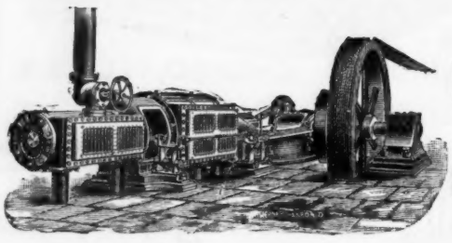

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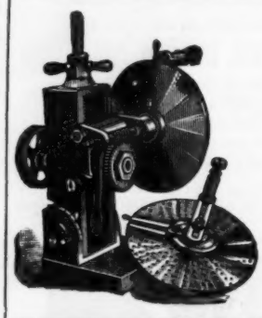

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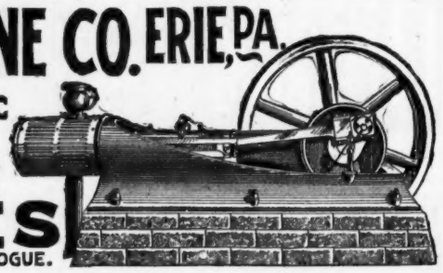

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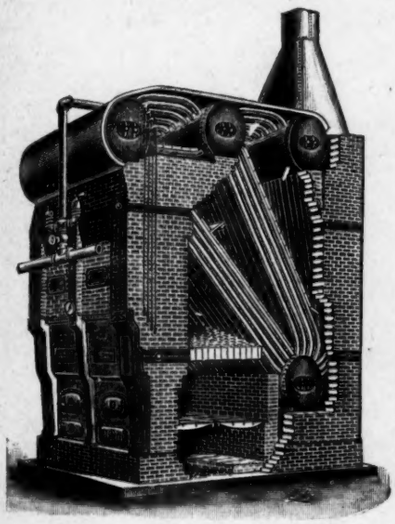

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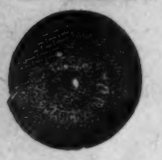

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